AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING
ENGINEERING • PRODUCTION • MANAGEMENT

JUNE 1, 1958

MATERIALS HANDLING SHOW NUMBER

In This Issue

Key Role of Industrial Trucks in Plants
Efficient Handling of Outboard Motor Parts
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Ford's Self-Contained Components Plant
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A CHILTON PUBLICATION

NEW from Standard Oil

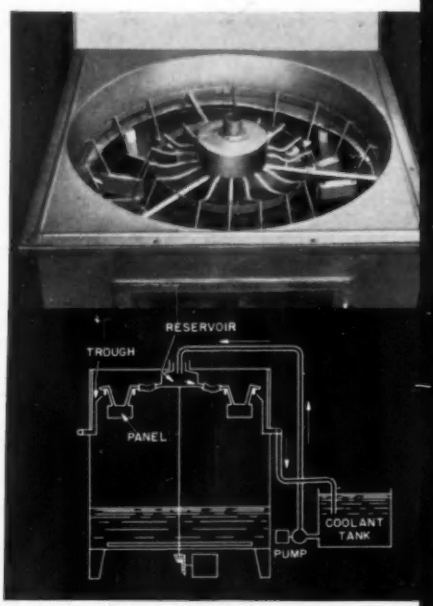
THE MAGIC BOX

Corrosion steals $5.5 billion from industry annually. Standard Oil is in the forefront of the fight to control this loss. Standard's research scientists have developed a new method for measuring the effectiveness of rust preventives. This new test takes less than one-twentieth of the time of previous tests—and is about three times as precise.

Using a controlled humidity cabinet for testing corrosion, these Standard research men installed a system for cooling metal test panels (previously treated with rust preventive) so that their surface temperatures are lower than the temperature in the cabinet. Temperatures of panel surfaces and of cabinet atmosphere are held accurately. Controlling the temperature of the panels controls the rate at which water condenses on them. This in turn (for the first time) permits accurate control of the amount of condensation on the panels. Rust preventives are more speedily and precisely tested. Science, as a result of this work, has a new tool with which to test corrosion.

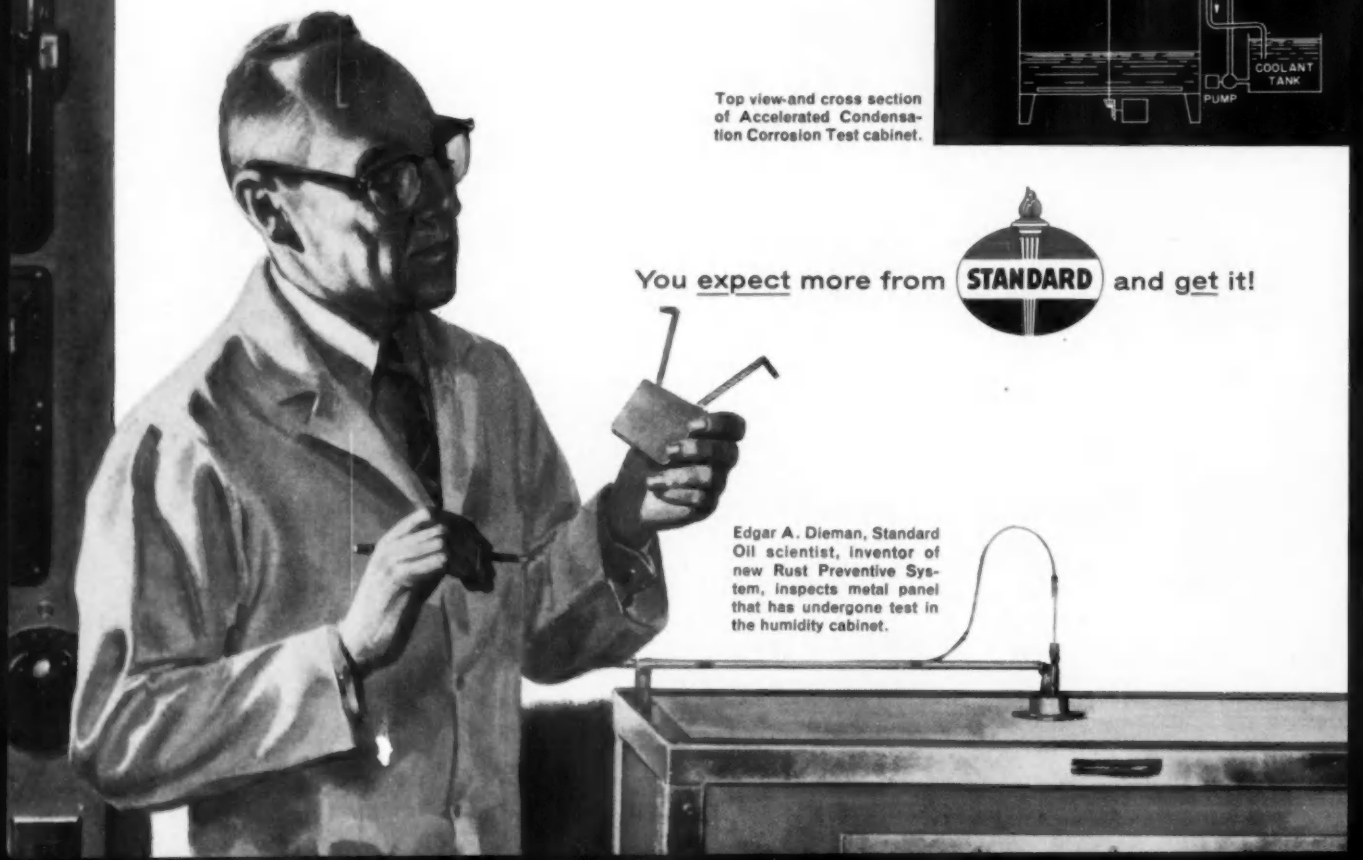
This is the research pay-out industry receives from Standard Oil. This is the something extra that backs up the Standard industrial lubrication specialist who calls on you. This is the something extra found in the products he sells.

To know more about how Standard Oil industrial lubrication specialists—and Standard's research program—can help you, call the Standard Oil office nearest you in any of the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.**



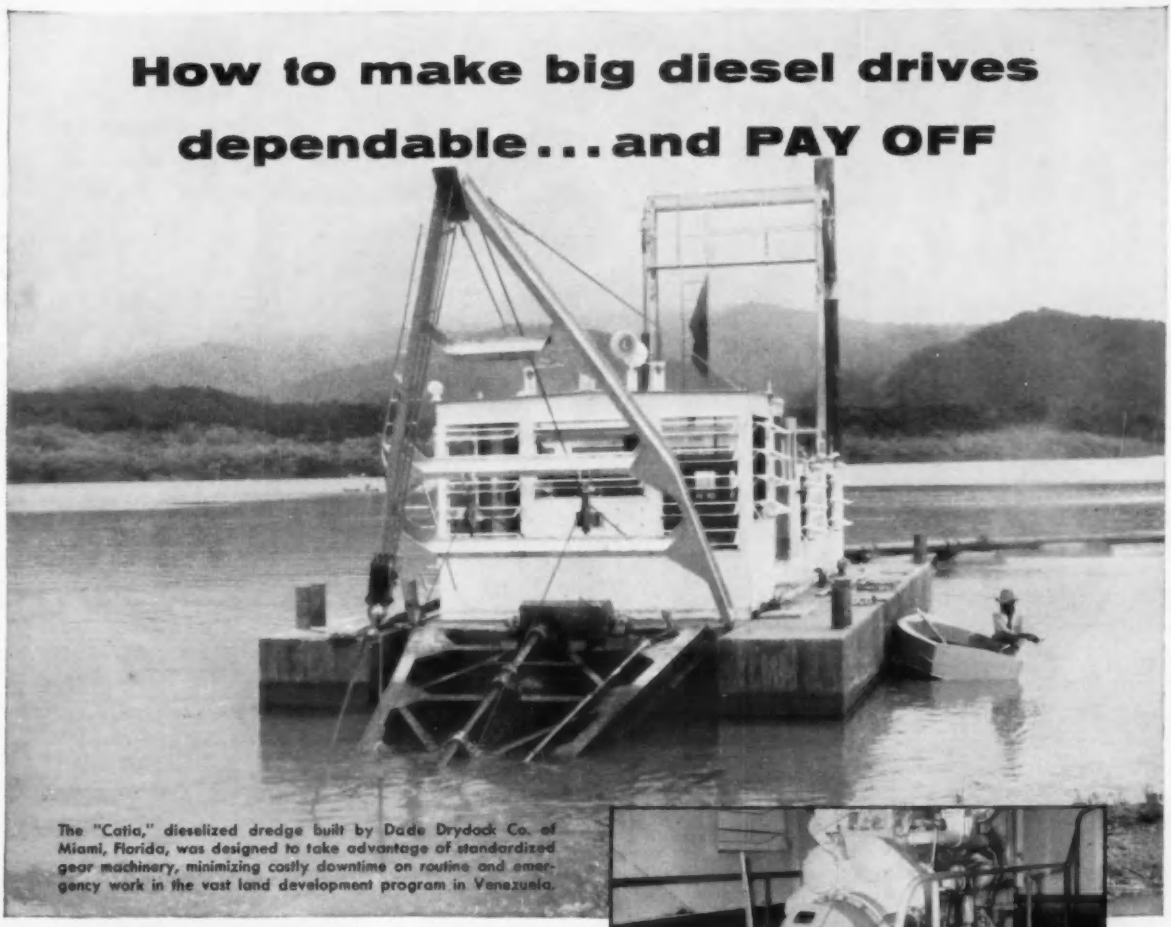
Top view and cross section of Accelerated Condensation Corrosion Test cabinet.

You expect more from STANDARD and get it!



Edgar A. Dieman, Standard Oil scientist, inventor of new Rust Preventive System, inspects metal panel that has undergone test in the humidity cabinet.

How to make big diesel drives dependable... and PAY OFF

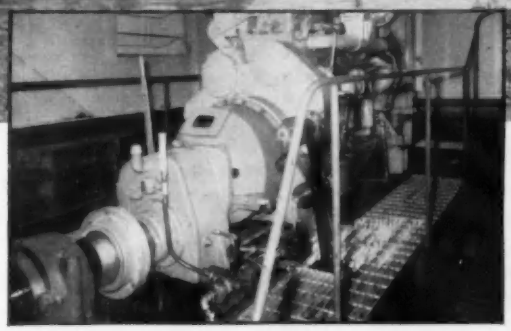


The "Catia," dieselized dredge built by Dade Drydock Co. of Miami, Florida, was designed to take advantage of standardized gear machinery, minimizing costly downtime on routine and emergency work in the vast land development program in Venezuela.

with COTTA HEAVY-DUTY REDUCTION UNITS

In designing hard-working, dieselized equipment that has to operate thousands of miles from the nearest repair parts facility, it will pay you to specify Cotta heavy-duty reduction units.

On the main pump of this dredge (shown working on the Caribbean shoreline), the builder used a Cotta 1.68:1 reduction unit behind a supercharged Caterpillar 4 cycle model D353 diesel engine. The pump has been in continuous operation since its completion in Miami several months ago, working at rates up to 150 yards of rock and sand per hour—more yardage per horsepower than from two other dredges used on this same project. The engine horsepower of 290 is easily delivered to the pump through the tough, smooth-operating Cotta reduction gear.



Whether you have a problem of transmitting 2,000 ft-lb of torque behind a big, high-speed engine, or providing multiple speeds at medium torque loads, Cotta can build you an "engineered-to-order" transmission or gear reducer, in quantities of *one* or 100, that will do the job when the going is rough and last the lifetime of the engine. Thousands of dependable Cotta units are in use all over the world on rail cars, cranes, winches, drilling rigs, trucks, and other heavy-duty mobile equipment.

THIS INFORMATION WILL HELP YOU

Sent free on request — diagrams, capacity tables, dimensions, and complete specifications. State your problem — COTTA engineers will help you select the right unit for best performance. Write today.

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS

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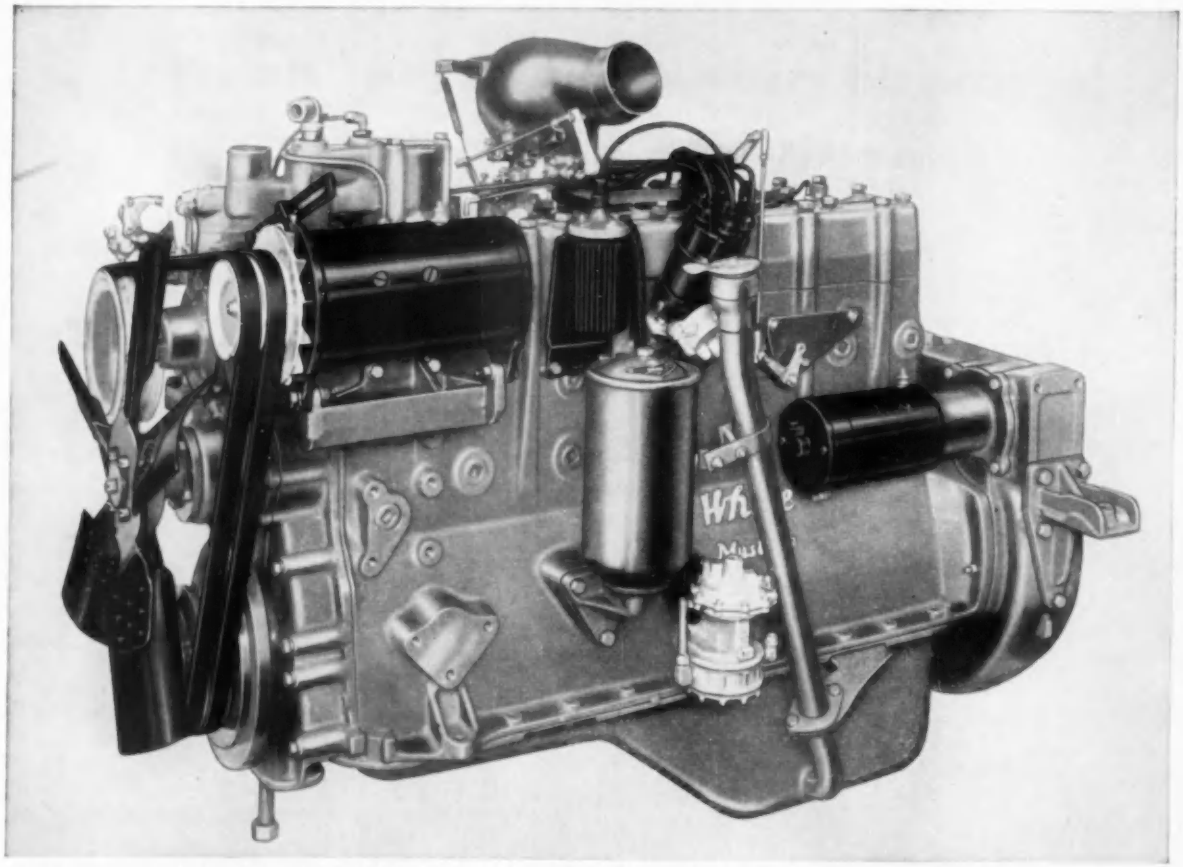
COTTA

HEAVY-DUTY REDUCTION UNITS

"Engineered-to-order"



The 400-Mustangs drive White's 3000, 4000, and 9000 series tractors. In these vehicles they are giving outstanding operating economy . . . due in part to White's use of Nickel cast iron blocks.

Newest White Mustang!

Extra strength of Nickel cast iron gives her extra "go"

This is a powerful, rugged engine . . . built for maximum "go" with minimum maintenance in day-in, day-out tractor trailer service.

White Motor Company builds it. It's one of their new 400-Mustangs (145, 160, 200, 215 HP). As in earlier Mustangs, blocks for the long-lasting 400s are made of a Nickel cast iron.

Nickel cast iron meets 4 design needs

White's traditional reliance on Nickel cast iron blocks for the Mustangs is soundly based on four design needs.

Extra strength Nickel cast iron gives the light, "pillar—type" Mustang block the extra strength needed for long, reliable heavy-duty service.

Pressure tightness With Nickel cast iron the complex block can be reliably cast with the pressure tightness needed in these high compression engines.

Extra wear resistance Nickel cast iron provides the improved wear resistance for this powerful engine.

Machinability Nickel cast iron gives White fast, easy machining. Its high strength is not obtained at a sacrifice in machinability and production costs are held down.

From the fleet operator's view point . . .
The light weight Nickel cast iron blocks in the Mustang improve operating economy, reduce maintenance and replacement costs, cut road side repairs.

If you buy or build internal combustion engines, look into the advantages of Nickel iron castings . . . for blocks, heads, flywheels, crank cases, camshafts, manifolds and other parts. Write for Inco's helpful "Guide to the Selection of Engineering Irons."

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York 5, N. Y.

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INCO TRADE MARK

AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE — PUBLISHED SEMI-MONTHLY

JUNE 1, 1958 — VOL. 118, NO. 11

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Meet the new army Mule!

Foot soldier's new friend is light, strong, maneuverable because many parts are made of MAGNESIUM

The U. S. Army has a new mule . . . minus the stubborn disposition! Developed by Willys Motors Inc., and Army Ordnance, it's the first mule in history—and the first Army vehicle—to carry a load heavier than its *own weight*. A major reason: Magnesium is used for the platform and wheel castings.

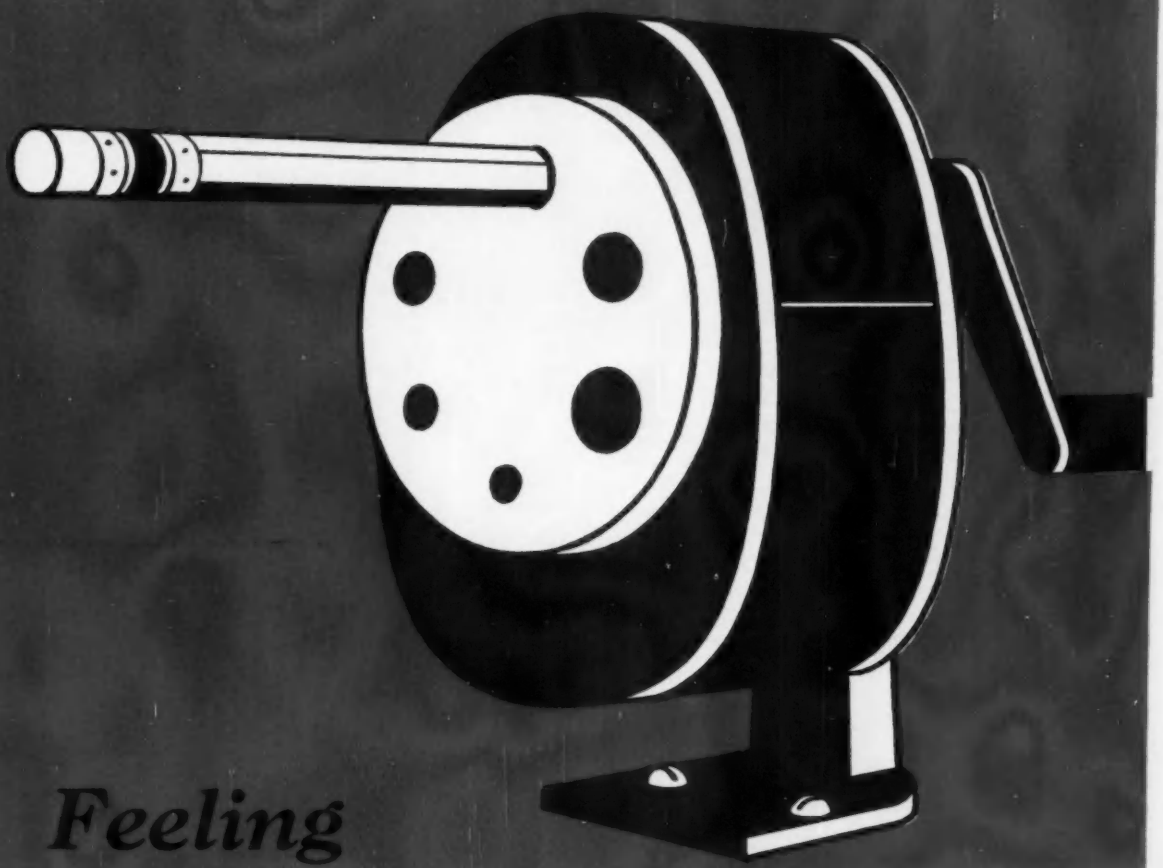
Because of its light weight and simplicity of design, the Mechanical Mule can be turned on its side or even upside down for maintenance or transportation purposes. It can be carried by helicopter . . . or dropped by parachute. Because of its strength, this vehicle can carry 1,000 pounds of equipment—yet it weighs only 900 pounds!

After successfully completing high-priority tests, the Mule has been placed in production and initial deliveries are being made to the famous 101st "Screaming Eagles" Airborne Division. This is another successful application of magnesium, lightest of all structural metals. If your product can benefit from this excellent combination of lightness and strength, be sure to contact your nearest Dow sales office or write THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. MA 1411E-1.

DRIVER'S SEAT and controls are located in the front, engine is underneath in the rear. Lightness, strength and simplicity of design—benefits of magnesium—were utilized fully in this new army vehicle.

WALKING, RIDING OR CRAWLING, the soldier can steer and control the speed to as low as 1 mph in forward or reverse—or cruise along at the rate of 25 mph!

YOU CAN DEPEND ON DOW



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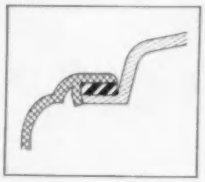
Technical data for gasket design and selection

NUMBER THREE

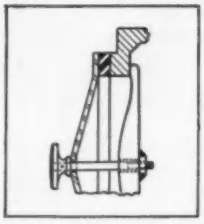
Gasket materials for low-cost flanges

Sealing of stamped or other low-cost flanges usually requires a gasket material that will seal irregular surfaces under fairly low bolting pressures.

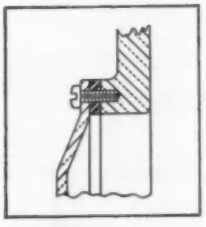
Such sealing jobs can be handled with Armstrong cork-and-rubber compositions, which are available in a wide range of compressibilities.



Three typical applications for these materials are shown here. Figure 1 is an automotive taillight assembly. A cork-and-sponged butyl composition provides a weather-tight seal, conforming to the normal irregularities in the plastic lens and die-cast rim.



In Figure 2, another cork-and-rubber compound provides an effective seal for a stamped hand-hold cover. Opening and closing of the cover are facilitated because the cork-and-rubber resists fatigue.

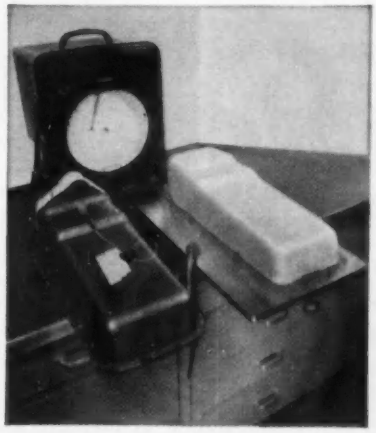


In the waterproof electric motor housing in Figure 3, an Armstrong cork-and-rubber composition accommodates surface irregularities in the stamped cover, yet stands up under exposure.

How to use plaster of Paris and compressed air to check oil leaks on lightweight flanges

Effective sealing of stamped flanges is complicated by their normal surface irregularities and by a tendency for these light flanges to distort under relatively low bolt loads. The obvious economies offered by these lightweight components have, however, led to their increasing use.

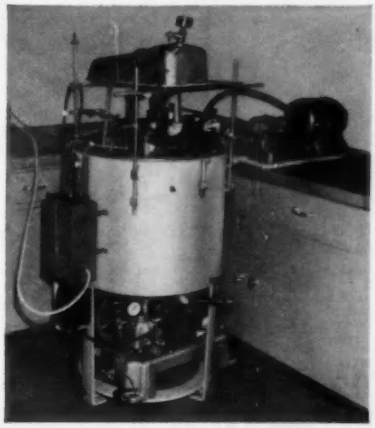
Designers who have experienced difficulty with gasket leaks on light flanges may find test methods developed by Armstrong engineers useful in evaluating the various factors that can contribute to the trouble.



Two such tests—both using standard automotive oil pans—are shown here.

The picture above shows an air leakage test. The oil pan is gasketed and bolted to a steel plate, and strain gauges are taped to it. Air at 25 psi is pumped into the pan and locked there. Leakage is sensed and continuously recorded in terms of reduction in stress. To increase the sensitivity of the test, the volume of air is reduced with a plaster mold.

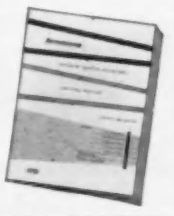
The results of the air leakage test are checked with a simulated service test shown at the right. Here, a gasketed oil pan is completely filled with oil at 250° F. and kept under constant pressure of 25 psi. Any leakage is visually observed.



These tests check the relative sealing efficiency of different kinds of gasket materials, and the effect of changes in width or thickness of the material. In addition, of course, the relative effect of variations in bolt loads, or changes in the number, size, and spacing of bolts can also be determined.

Engineering research on problems of gasket performance, design, and selection is a full-time activity at Armstrong. The results of this work may be of help with gasket problems you may have. We'll be glad to make suggestions if you send details to us.

For your copy of our gasket materials catalog, write Armstrong Cork Company, Industrial Division, 7106 Imperial Ave., Lancaster, Pennsylvania.



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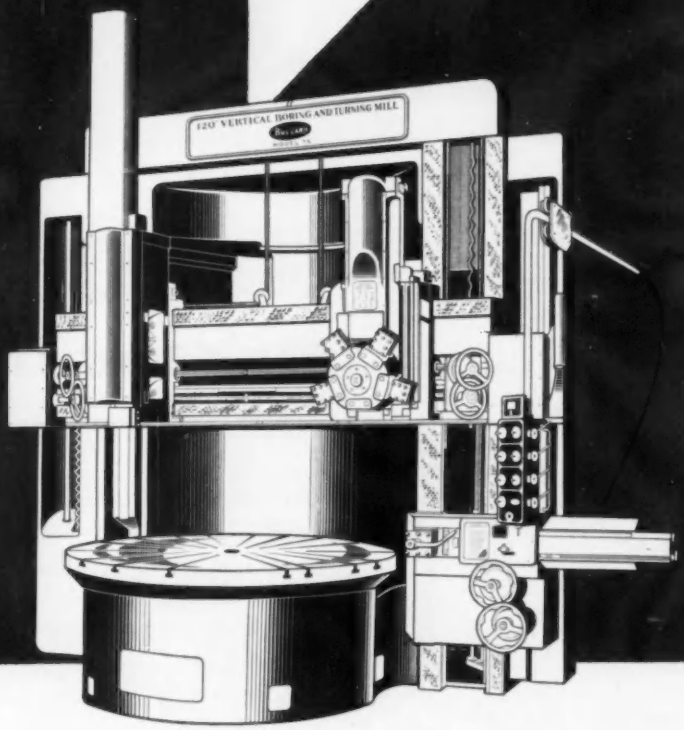

The Bullard 120 Vertical Boring and Turning Mill is designed, engineered and built to meet this customer demand. Feature for feature — by comparison — you'll find it is the outstanding mill on the market today.

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Spun-end construction adds extra quality to Honeywell closed-end drawn metal protecting tubes . . . at no increase in price.

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**Inconel is a trade name of the International Nickel Company.*
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New miracle pump custom-blends gasoline in the exact octane strength to fit any car!

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Today's big difference in gasoline is Sunoco's new Custom-Blending. Here is a new, thriftier way to fuel any car. No matter what make of car, or whatever the compression ratio of its engine, Sunoco Custom-Blending can fit its octane requirements exactly.

Sunoco's miracle pump custom-blends six different gasolines . . . six different octane strengths to accurately fit any car.

So, for today's needs, and tomorrow's designs, no matter what the octane requirement built-in, Sunoco's accurate Custom-Blending system will deliver the right fuel at the right price.

BLUE SUNOCO

CUSTOM-BLENDED AT THE PUMP

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Sectionized Transfer-matic Machines Hydraulic Steering Gear Housings

Established 1898

THE **CROSS** CO.

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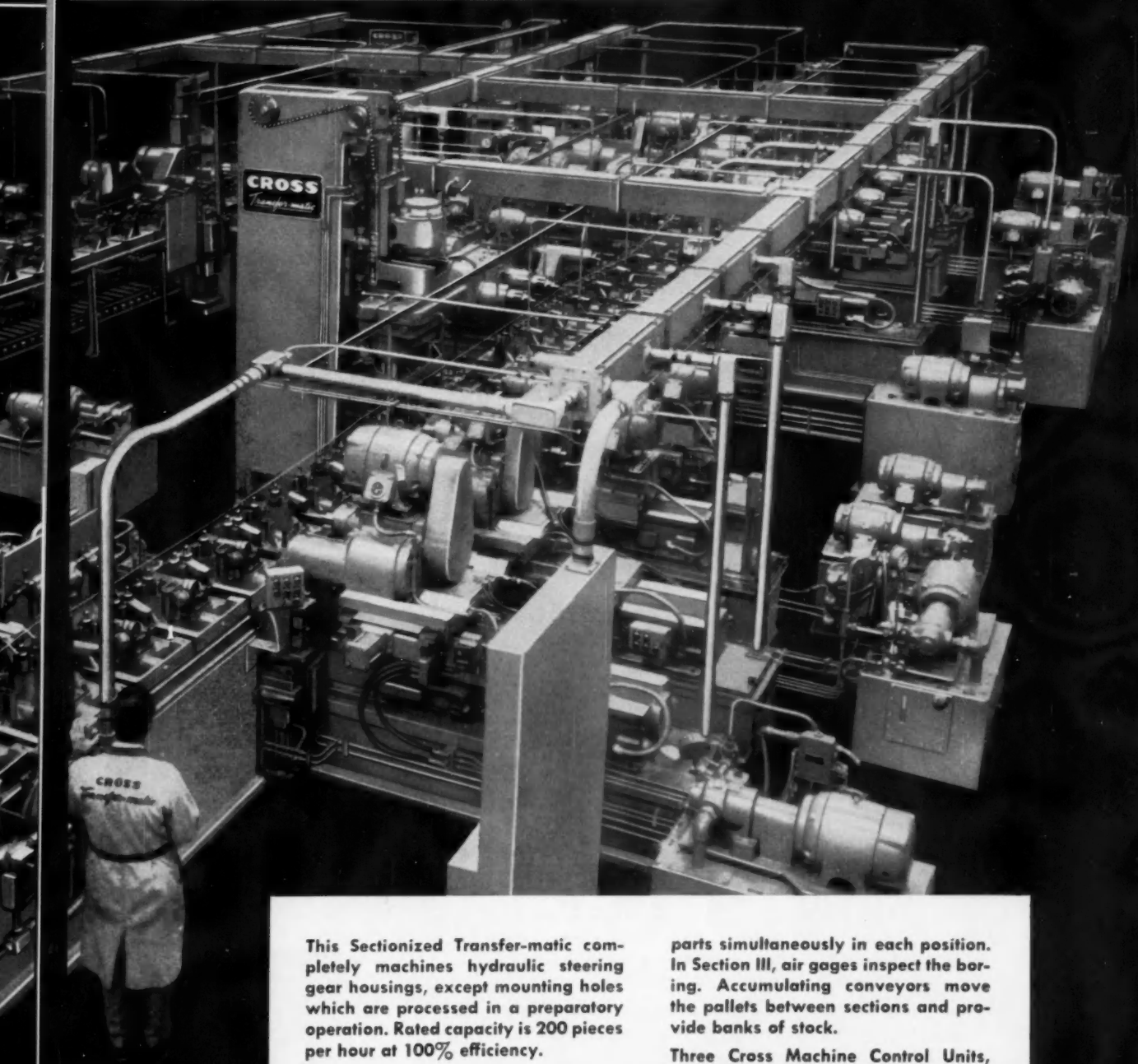


This Sectionized Transfer-matic completely machines hydraulic steering gear housings, except mounting holes which are processed in a preparatory operation. Rated capacity is 200 pieces per hour at 100% efficiency.

The housings are power clamped to pallet work holding fixtures which are transferred through three machine sections. In Section I, housings are milled, drilled, reamed, spotfaced, tapped and rough bored. Fixture clamps are then released to relieve machining strains. In Section II, single point precision boring completes the machining. Production is balanced by boring four parts simultaneously in each position. In Section III, air gages inspect the boring. Accumulating conveyors move the pallets between sections and provide banks of stock.

Three Cross Machine Control Units, with Toolometers to program tool changes, minimize downtime. Tool setting fixtures are provided to pre-set tools, thus eliminating trial cuts and adjustments.

Other features are complete interchangeability of all standard and special parts for easy maintenance, construction to JIC Standards, hardened and ground ways, and automatic lubrication.

NEW! Simpler housing and one-piece bearing reduce maintenance on Thompson Turbocharger

Designed for 10,000 operating hours under the severest operating temperatures and speeds. This means longer revenue runs between scheduled maintenance of the unit, and fewer unscheduled downtimes for repairs.

Turbine housing of the new Thompson Turbocharger is a heat-resistant alloy designed to eliminate corrosive attack and to be free from service cracks. Design also isolates high-temperature exhaust drive from bearing and air-side of turbocharger to increase maintenance-free life.

Bearing is one-piece design, mounted on small diameter shaft to reduce bearing surfaces speed even at high rpm.

Design of impeller supplies supercharging air at equal compression ratios over a larger flow range and at lower rotor speeds than other turbochargers. Light-alloy rotor provides instant response to changes in engine speed and load.

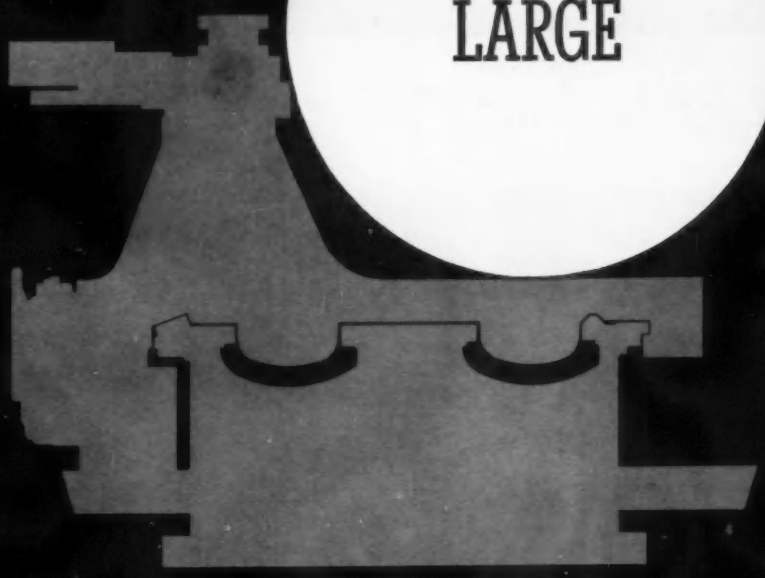
Your blown diesel engines up to 300 horsepower can be readily equipped with new-design Thompson Turbochargers. Our engineers will help. When may they call?

Write today on your company letterhead for Booklet AI-658 which contains technical data on Thompson Turbochargers for blown diesel engines up to 300 horsepower.

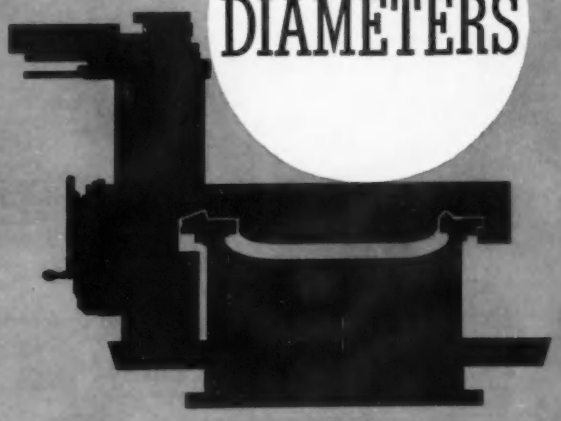
JET DIVISION
Thompson Products, Inc.
Cleveland 17, Ohio

TURNING

LARGE

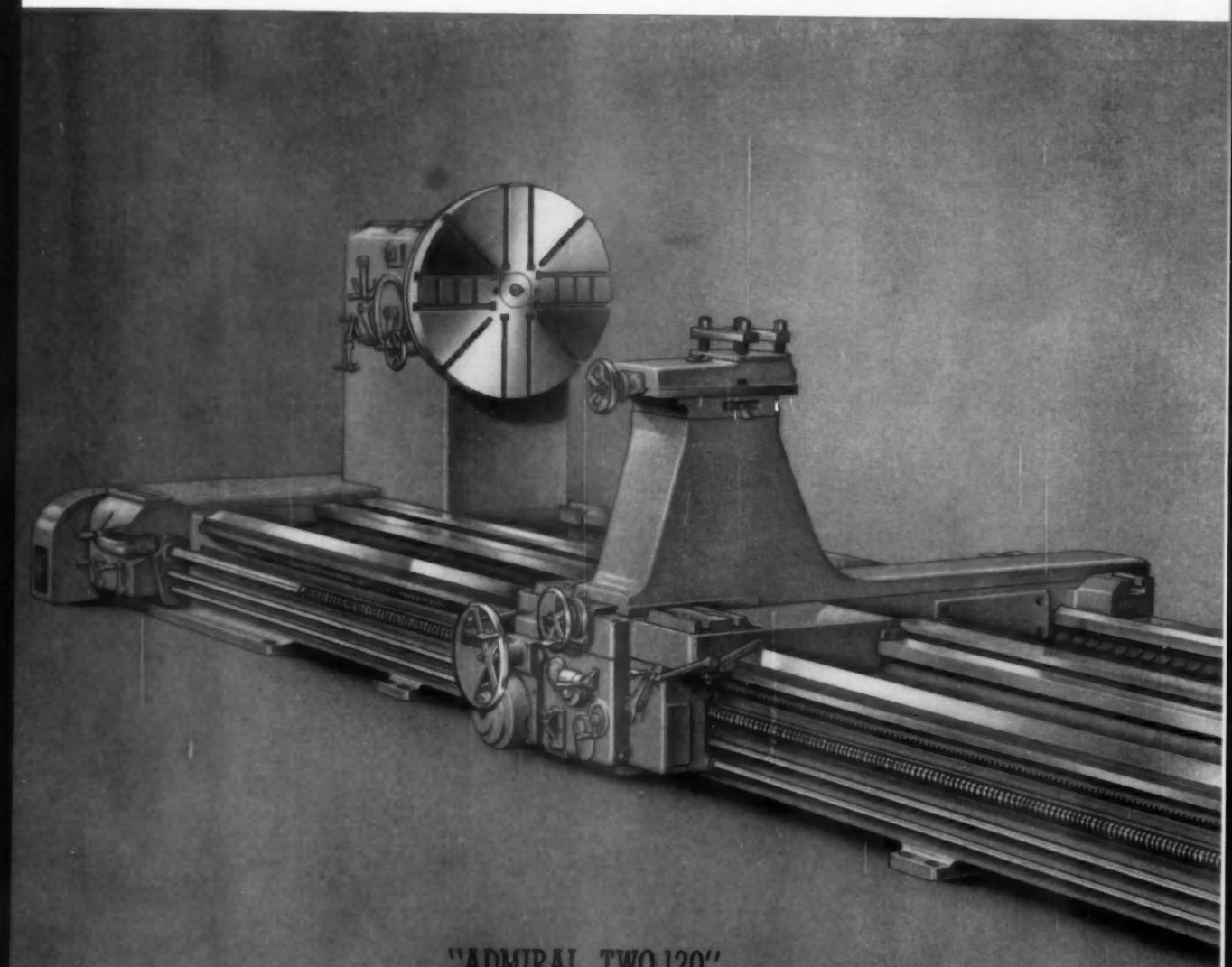


DIAMETERS



On two new LeBlonds

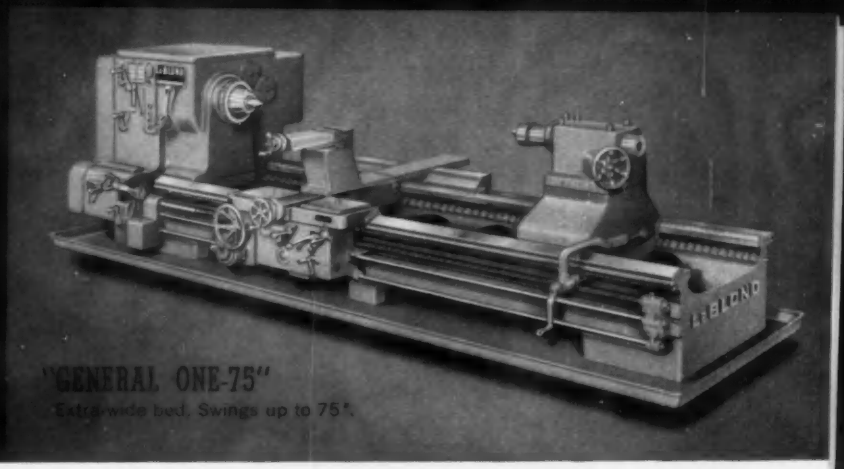
TWO NEW LEBLONDS



"ADMIRAL TWO-120"

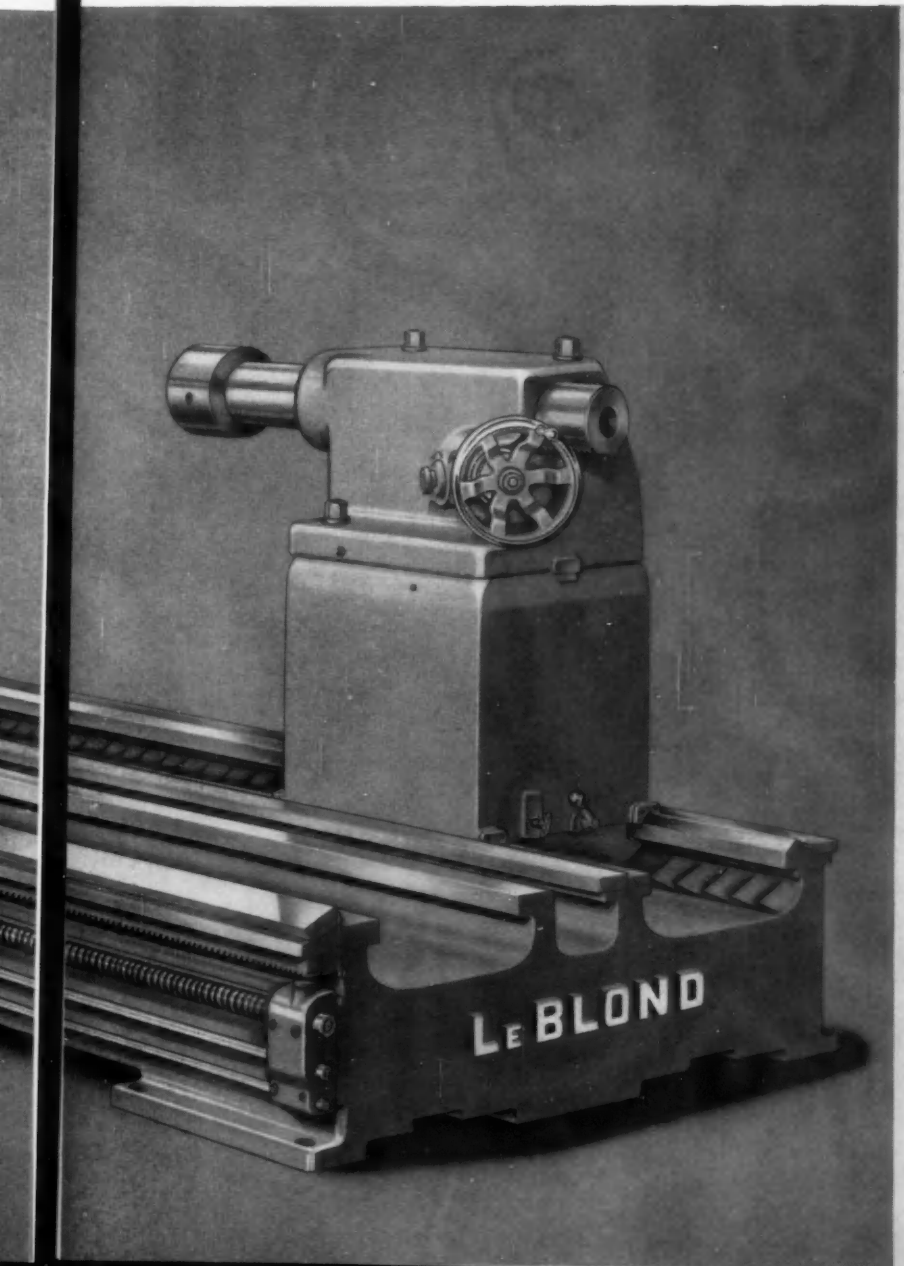
Double-bed construction, two beds integrally cast in parallel. Currently designed to swing up to 120". Center distance as required.

for turning large diameters



"GENERAL ONE-75"
Extra-wide bed. Swings up to 75".

Missile bodies and other large cylindrical, tubular and fabricated parts . . .



A new class of LeBlond lathes is born—big swing with relatively light horsepower (up to 50 hp). You buy only as much power as your jobs require.

Two new wide bed designs assure that cutting force is properly absorbed into the bed. In addition, you get famous LeBlond rigidity, stamina and convenience, throughout. Two basic models are available, with whatever variations your work may require.

Tracing is available on both machines—Hydra-Trace, two-way duplicating attachment or our new 90° tracer.

Tell us about your large diameter turning jobs. LeBlond engineers are available to work with you in adapting these basic lathe designs to any turning problem you may have. Write us today for complete information.

. . . cut with confidence

LeBLOND *of Cincinnati*

The R. K. LeBlond Machine Tool Company
Cincinnati 8, Ohio

World's Largest Builder of A Complete Line of Lathes for More Than 71 Years

FOR HAY

CORN - OR

COTTON

Accurate, Dependable Steering Requires MECHANICS Precision

Row crop tractor manufacturers rely on MECHANICS Roller Bearing UNIVERSAL JOINTS for accurate, dependable steering—free from backlash. Stamped yoke, projection welded types make possible economical installation. Compact types fit snugly into cramped space and into strings of three joints—between the steering wheel and gear box. Let MECHANICS engineers help design efficient steering strings for *your* products.

MECHANICS
UNIVERSAL JOINT
DIVISION
Borg-Warner
2024 Harrison Ave.
Rockford, Ill.

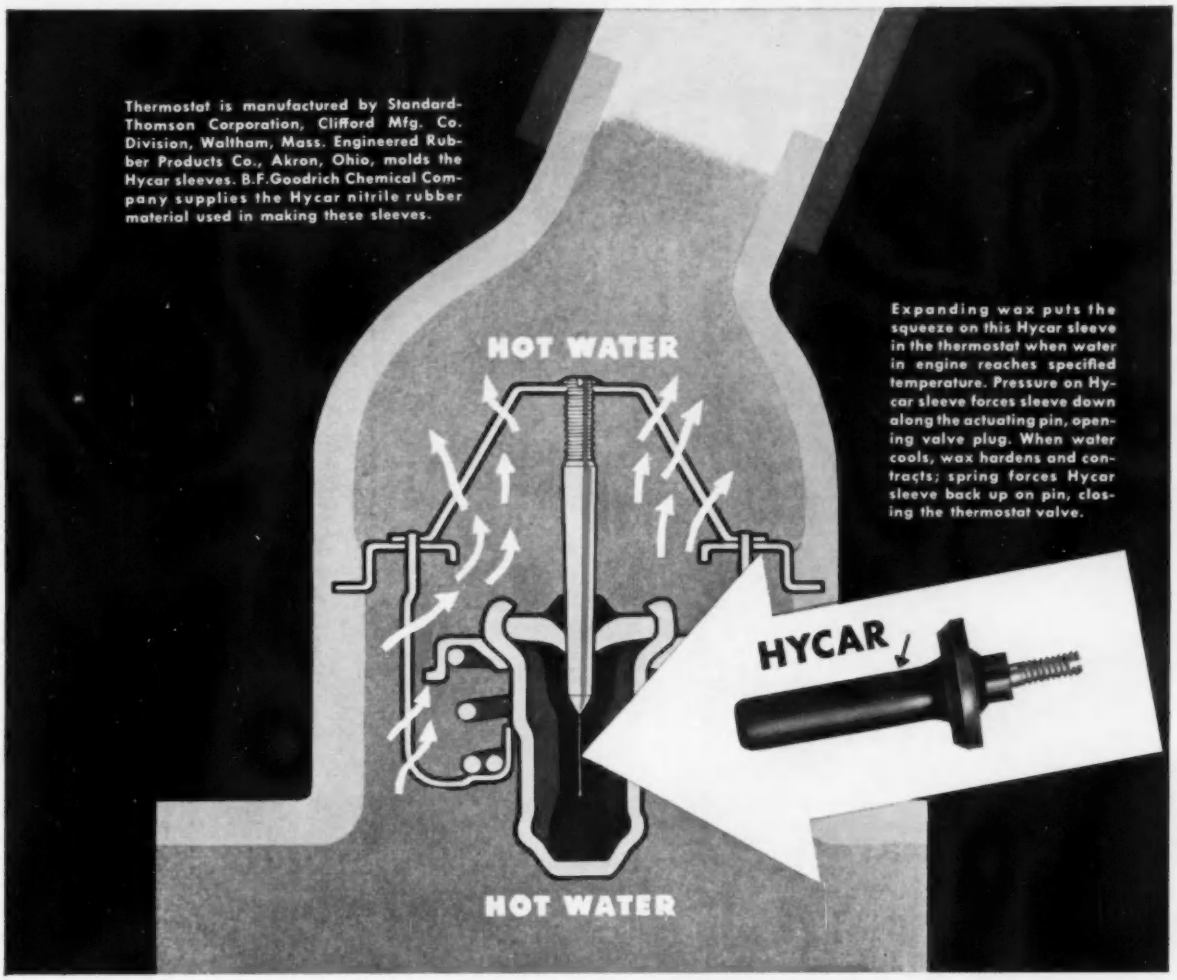
Export Sales Borg-Warner International
35 So. Wabash, Chicago 3, Ill.

MECHANICS
Roller Bearing BW
UNIVERSAL JOINTS

For Cars • Trucks • Tractors • Farm Implements • Road Machinery • Aircraft • Tanks • Busses and Industrial Equipment

Another new development using

B.F.Goodrich Chemical *raw materials*


Thermostat is manufactured by Standard-Thomson Corporation, Clifford Mfg. Co. Division, Waltham, Mass. Engineered Rubber Products Co., Akron, Ohio, molds the Hycar sleeves. B.F.Goodrich Chemical Company supplies the Hycar nitrile rubber material used in making these sleeves.
HOT WATER
Expanding wax puts the squeeze on this Hycar sleeve in the thermostat when water in engine reaches specified temperature. Pressure on Hycar sleeve forces sleeve down along the actuating pin, opening valve plug. When water cools, wax hardens and contracts; spring forces Hycar sleeve back up on pin, closing the thermostat valve.
HYCAR
HOT WATER

Hycar controls heat of automobile engine operation

A SLEEVE of Hycar nitrile rubber solves a thermostat operating problem of high pressure cooling systems. Hycar is ideal because it is not affected by antifreeze chemicals or heat. It provides flexibility with high strength and exceptional resistance to volume change and abrasion.

Hycar nitrile rubber makes possible improved existing products and new products, too. Get information on it by writing Dept. KF-3, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Hycar
American Rubber

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich

GEON polyvinyl materials • HYCAR American rubber and latex
GOOD-RITE chemicals and plasticizers • HARMON colors

KS

AUTOMOTIVE PRODUCTS

Distinctive STYLING

Skillful ENGINEERING

Careful MANUFACTURING

Dependable CONTROL

KING-SEELEY CORPORATION
ANN ARBOR, MICHIGAN

AUTOMOTIVE HARDWARE

GAUGES
- Ammeters
- Fuel Level
- Oil Pressure
- Special Purpose
- Temperature
- Voltmeters

GOVERNORS
- "Servo" Mechanical—Diesel
- Handy
- Vari-Speed-Velocity
- Visible—Action

INSTRUMENT CLUSTERS

INSTRUMENT PANELS

ODOMETERS

REGULATORS, CONSTANT VOLTAGE

SERVO MECHANISMS (Heater Control)

SIGNALS
- Fuel Warning
- Oil Pressure Warning
- Oil Level Warning
- Special Purpose
- Speed Warning
- Temperature Warning

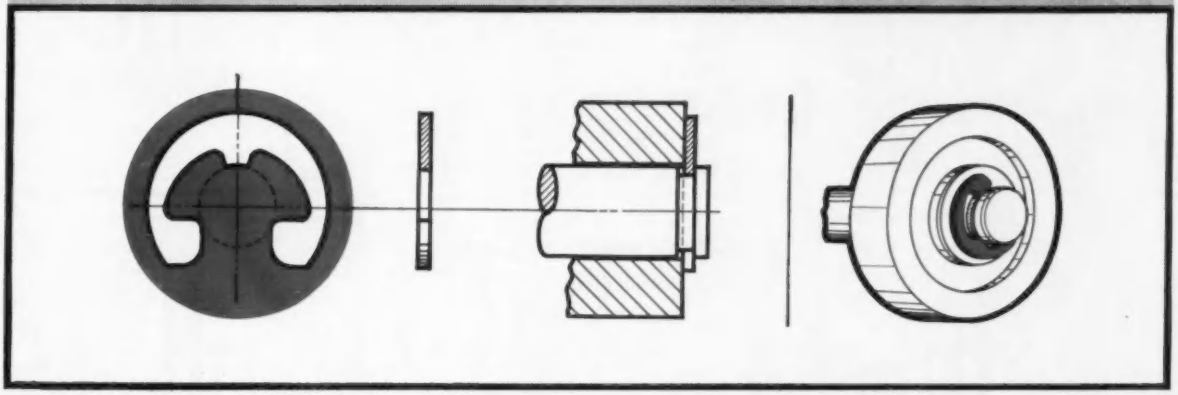
SPEEDOMETERS

SWITCHES
- Delay Relay (Ride Control)
- Inhibitor (Automatic Shift)
- Oil Pressure
- Special Purpose
- Temperature

TACHOMETERS

8096

New Waldes Truarc Reinforced "E-ring" Provides 5 Times More Gripping Power, 50% Higher RPM Limits Than Conventional E-Type Rings



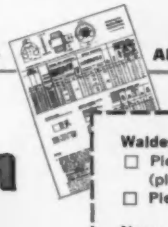
The new Waldes Truarc Series 5144 is a radially-installed reinforced "E-ring." It is designed for use in assemblies where the ring is subject to strong push-out forces resulting from heavy vibration and shock loads, high rotational speeds or relative rotation between the retained parts.

Series 5144 provides the following application advantages over conventional E-type fasteners:

1. **GREATER GRIPPING STRENGTH**—approximately five times greater than conventional "E-rings" of the same metal and thickness.
2. **HIGHER RPM LIMITS**—approximately 50% higher in most sizes.
3. **POSITIVE LOCKING IN THE GROOVE**—large corner radii or chamfers can be accommodated without separator washers.
4. **LOWER GROOVE COSTS**—because recommended groove tolerances have been increased, machining grooves for the series 5144 is less expensive.
5. **WIDER APPLICATION**—because series 5144 rings made of aluminum are stronger than conventional "E-rings" made of steel, the fastener may be used in applications where corrosion resistance or weight are factors.

Truarc Series 5144 Reinforced "E-rings" are available for shaft diameters from 3/32—7/16 in. in carbon spring steel, stainless steel, beryllium copper, aluminum, and phosphor bronze. They are available stacked on rods for high speed installation with Truarc applicating and dispensing equipment.

As in all Truarc rings, you get statistically controlled quality from engineering and raw materials to the finished product. Complete selections are available from leading OEM distributors in 90 stocking points throughout the U. S. and Canada. Design Engineering Service is available to you. Send us your blueprints. Let our Truarc engineers help you solve design, assembly and production problems... without obligation.

SEND FOR FREE SAMPLES  **AND ENGINEERING DATA**

WALDES

TRUARC®

RETAINING RINGS

WALDES KOHINOOR, INC., LONG ISLAND CITY 1, N. Y.

Waldes Kohinoor, Inc., 47-16 Austel Place, L.I.C. 1, N.Y.
☐ Please send me sample Reinforced "E-rings." (please specify shaft size)_____
☐ Please send me Engineering Data Sheet

Name_____

Title_____

Company_____

Business Address_____

City_____ Zone_____ State_____

AY 060

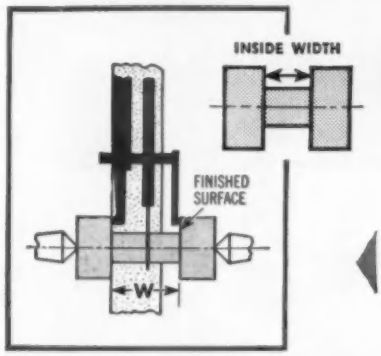
Consult the Yellow Pages of Your Telephone Directory for Name of Local Truarc Factory Representative and Authorized Distributor. Look under "Retaining Rings" or "Rings, Retaining."

DO THESE JOBS, TOO!

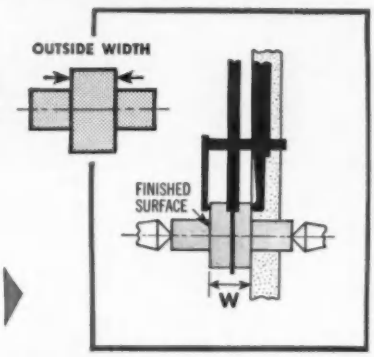
with the Arnold Continuous Grinding Gage.

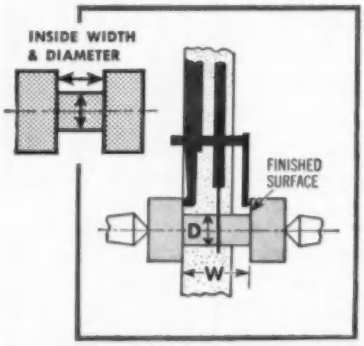
DISTRIBUTED BY

FEDERAL

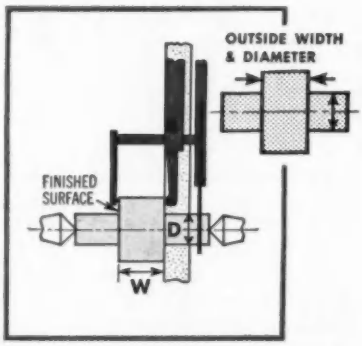


Use Model WF for Inside Width Gaging or for Outside Width Gaging

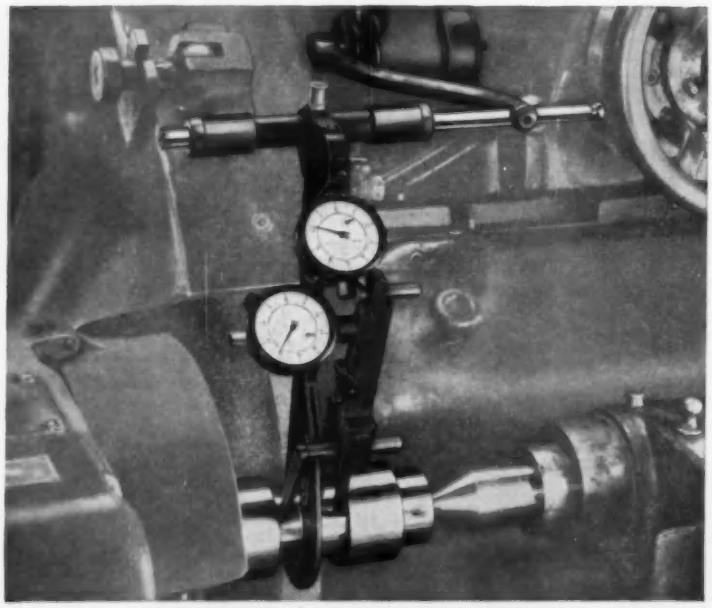




Use Model LWF for Inside Width and Diameter Gaging or for Outside Width and Diameter Gaging



These gages can also be air or electric operated and can be applied to automatic machine control.



The Arnold Grinding Gage is so frequently used to control the *diameter* of work on external grinders, its ability to gage a variety of other dimensions is often overlooked. You may be surprised to know that Federal Arnold Gages are regularly gaging *both inside and outside widths as well as diameters and simultaneously!*

Federal Arnold Grinding Gages assure maximum output per machine-hour, with *definitely less scrap*, less fatigue per man-hour — and better assembly, better performance and better production *at less cost per piece.* Catalog 55A shows other possibilities.

Federal Products Corporation
8266 Eddy St., Providence 1, R. I.

Ask **FEDERAL** *First*

FOR RECOMMENDATIONS IN MODERN GAGES . . .

Dial Indicating, Air, Electric, or Electronic—for Inspecting, Measuring, Sorting, or Automation Gaging

FEDERAL'S SOLUTION TO THE COST OF GAGING:
Impartial Gage Selection
Engineering Follow-Through
Everything in Gages

GUARANTEED PURITY!

Argon of 99.995% minimum purity

Guaranteed by LINDE!

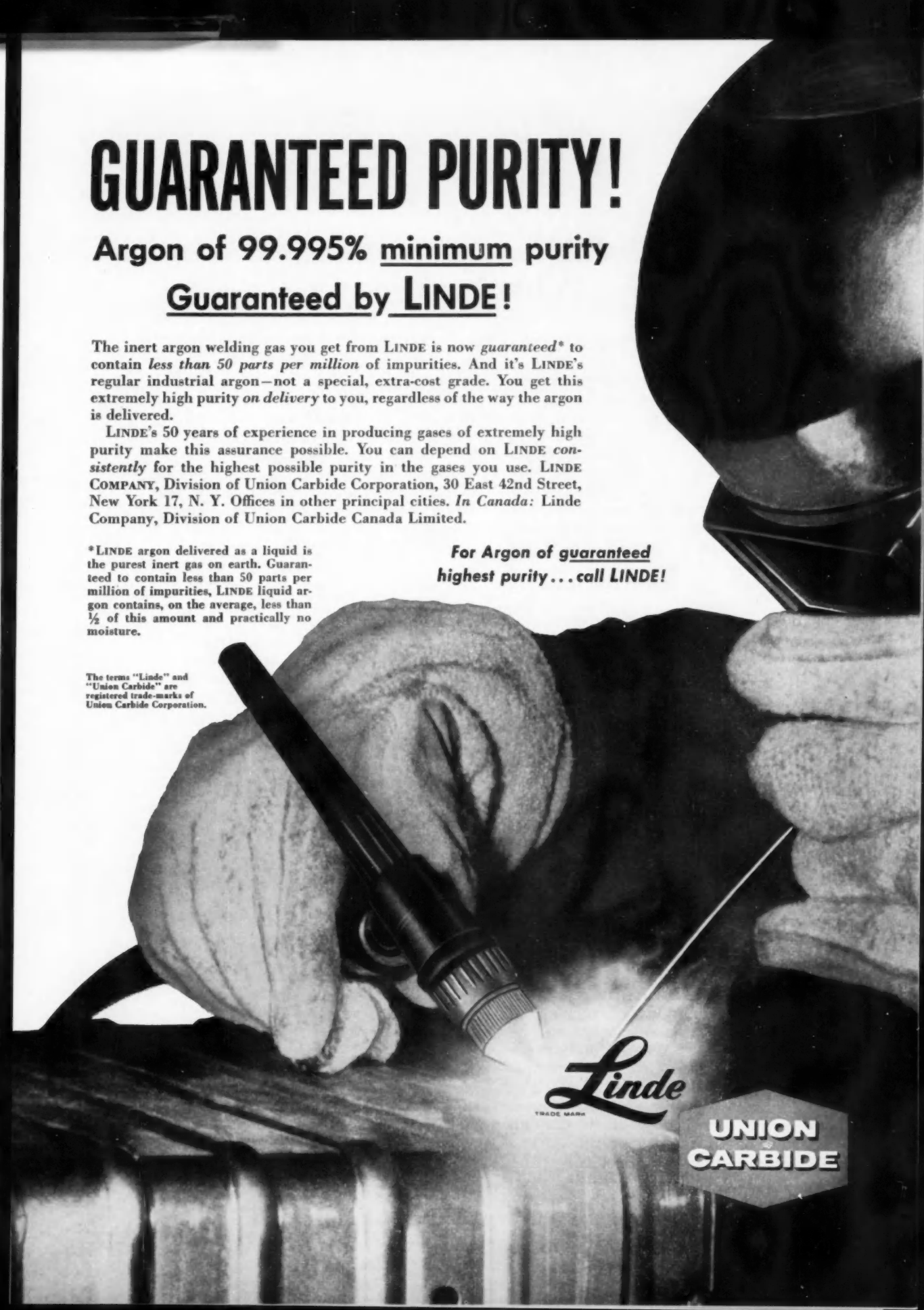
The inert argon welding gas you get from LINDE is now *guaranteed** to contain *less than 50 parts per million* of impurities. And it's LINDE's regular industrial argon—not a special, extra-cost grade. You get this extremely high purity *on delivery* to you, regardless of the way the argon is delivered.

LINDE's 50 years of experience in producing gases of extremely high purity make this assurance possible. You can depend on LINDE *consistently* for the highest possible purity in the gases you use. LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. Offices in other principal cities. *In Canada:* Linde Company, Division of Union Carbide Canada Limited.

*LINDE argon delivered as a liquid is the purest inert gas on earth. Guaranteed to contain less than 50 parts per million of impurities, LINDE liquid argon contains, on the average, less than ½ of this amount and practically no moisture.

For Argon of guaranteed highest purity . . . call LINDE!

The terms "Linde" and "Union Carbide" are registered trade-marks of Union Carbide Corporation.



XXVIII

This is the twenty-eighth of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many in this field, including men of broad experience who may find it useful to review fundamentals from time to time.

Cold-Finishing of Alloy Steel Bars: Turning and Polishing

Continuing our discussion of the cold-finishing of alloy steel bars, we take up the subject of turning and polishing. A later discussion will cover grinding and polishing. Both require removal of surface metal. In both the turning and grinding operations, adequate allowances provide for the removal of decarburization and surface defects which sometimes occur in alloy bars.

As previously stated, the outstanding advantage of cold-drawn bars over hot-rolled bars is the *bright, smooth finish*. However, the quality of the cold-drawn finish varies with the size and amount of draft (reduction of cross-sectional area) applied in cold-drawing. For example, by using a 1/16-in. draft, a 3/4-in. round would have a better cold-drawn finish than a 3-in. round.

When a superior mirror-like finish with additional accuracy is required on surfaces that are not machined (such as on shafting or machine parts), two processes other than cold-drawing are suggested: turning and polishing, and grinding and polishing. The first of these will be discussed here.

Turning and Polishing. This method of cold-finishing is generally associated with centerless bar-turners, accommodating rounds from 1 1/4-in. to 6-in. diam, inclusive. The process is the reverse of conventional lathe-turning, which is normally used for larger sizes. The centerless turning equipment uses two cutter heads which contain from one to four cutting tools. The system provides for both rough and finish cuts. The bar, which is stationary, is fed horizontally into the rotary cutter heads by means of a mechanical or hydraulic feeding mechanism. Most bar-turners are equipped with a series of polishing rolls that also rotate around the bar as it feeds from the rotary cutter heads. This, combined with subsequent burnishing action from the straightening rolls, imparts a high degree of polished finish to the product. A polished surface on a turned bar can also be produced by a number of passes through the straightening rolls.

This process is applicable to normalized, annealed, or heat-treated carbon and alloy bars. It does not materially affect the mechanical properties. For this reason, the end product can be machined unsymmetrically, with little or no tendency to warp.

Bethlehem metallurgists will gladly work out any problem in the cold-finishing of alloy steel bars. Always feel free to ask for their services.

When you are in need of steels remember, too, that Bethlehem manufactures the entire range of AISI standard alloy grades, as well as special analysis steels and all carbon grades.

If you would like reprints of this series of advertisements, please write to us, addressing your request to Publications Department, Bethlehem Steel Company, Bethlehem, Pa. The subjects in the series are now available in a handy 40-page booklet, and we shall be glad to send you a free copy.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

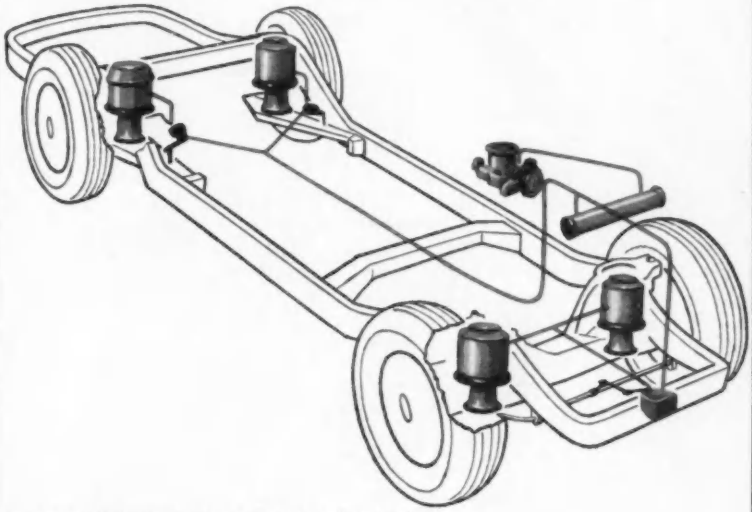
DU PONT

Better Things for Better Living ... through Chemistry

AUTOMOTIVE ENGINEERING NEWS

ZYTEL® NYLON RESINS

Tubing of Du Pont ZYTEL® overcomes toughest sub-chassis conditions in air suspension and lubrication systems



NEW AIR SUSPENSION SYSTEMS, such as the one diagramed above, use strong tubing of ZYTEL nylon resin.

Tubing of ZYTEL nylon resin is now incorporated in many of the new air suspension systems, because it can take the punishment of tough conditions close to the road. ZYTEL first proved its resistance to petroleum chemicals and high pressures in self-contained lubrication systems for automobiles. So, applying the tubing to air suspension systems was another step forward in design. These lines operate over a wide temperature range, and are very tough and resistant to abrasion.

Tubing made of Du Pont ZYTEL is used with standard fittings, can be color coded for identification and is easily installed without deburring or special tools. ZYTEL has a specific gravity of 1.14—one-seventh the weight of copper. It is impervious to lubricating and hydraulic fluids.

NEW PRINTED CIRCUITS for vehicle control panels use removable lamp sockets molded of black ZYTEL nylon resin. The sockets have excellent dimensional stability, high strength and offer the necessary electrical insulation. Small, intricate parts are often molded of ZYTEL using multi-cavity dies, fast cycles. Injection molding is economical for quantity production. Further economies come from minimum waste of material . . . no need for finishing.

* * *

We're offering a design book that we believe will be useful to you. Check off your needs on the coupon and send it to us.

New Design Manual

—shows you how to apply standard equations in designing with ZYTEL. Gives tables, graphs and sample calculations. Information on loads, stresses, gears, bearings. First aid for *redesign* of parts. Send the coupon.

E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Dept.
Room 46, Du Pont Building, Wilmington 98, Delaware

☐ Please send new manual: **DESIGNING WITH "ZYTEL" NYLON RESIN.**
☐ Please send me additional information on Du Pont ZYTEL nylon resins.
I am interested in evaluating this material for_____

*Name*_____

*Company*_____ *Position*_____

*Street*_____

*City*_____ *State*_____

*Type of Business*_____

In Canada: Du Pont Company of Canada (1956) Limited, P. O. Box 660, Montreal, Quebec.

Seventy-five Years ◇◇◇

TEN MILES an hour was "speed" in 1883 when Wyman-Gordon started to make forgings for the high-wheel bicycle. Through the 75 intervening years forgings have made important contributions to the phenomenal advances in propulsion. Progress from the first "horseless carriages"...from the early "flying machines"...to the supersonic speeds of today ...would not have been possible without forgings produced by the most advanced techniques of the day.

Wyman-Gordon is proud of its achievements in these fields and, as the largest producer of automotive and aircraft forgings, is prepared to accept the challenge of the future. Today, as for 75 years, there is no substitute for Wyman-Gordon quality and experience.

WYMAN-GORDON COMPANY

Established 1883

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL • TITANIUM

WORCESTER 1, MASSACHUSETTS
HARVEY, ILLINOIS • DETROIT, MICHIGAN

NEW

TUTHILL POWERMAX

Hydraulic pumps and Fluid motors

- **For pressures to 1500 psi**
- **Pump capacities from 1.2 to 14.2 gpm**
- **For speeds to 3600 rpm**

TUTHILL, producers of quality pumps since 1927, proudly announces its new line of POWERMAX hydraulic pumps and fluid motors. Produced in a complete selection of seven different models, these rugged, compact new units incorporate the quality construction and advanced engineering that industry has learned to expect from TUTHILL.

POWERMAX pumps and fluid motors use precision-ground, involute spur gears of heat-treated alloy steel, especially designed for efficient and quiet operation. Large, heavy-duty, anti-friction bearings . . . hard, long-wearing, double wear plates of a special bronze alloy . . . double lip-type shaft seals . . . generously proportioned heat-treated alloy steel shaft . . . these are just a few of the many quality construction features which insure long, trouble-free life for POWERMAX pumps and motors.

The compact design of these units saves space and simplifies installation problems. They can be provided for either flange or foot mounting and with either side or rear ports as standard (front porting is available on special order). POWERMAX pumps or motors may be supplied with a built-in relief valve if desired.

Duplex or tandem models

For applications such as power steering where two pumps of substantially different operating characteristics are required, POWERMAX pumps may be furnished in duplex or tandem models, with both units mounted on a single shaft. This allows substantial savings through the elimination of a second driving source, reductions in hydraulic piping, and lower installation costs.

A new Catalog, No. 111, gives complete information on these new POWERMAX pumps and hydraulic motors. Included are performance curves, dimensional data, construction features . . . all the detailed engineering information you need. Write today for your copy.

TUTHILL PUMP COMPANY
941 East 95th Street, Chicago 19, Illinois

☐ Please forward copy of Catalog No. 111 on new POWERMAX hydraulic pumps and fluid motors.
☐ Please have your representative call.

NAME_____ TITLE_____
COMPANY_____
STREET_____
CITY_____ STATE_____

Tuthill Manufactures a Complete Line of Positive Displacement Rotary Pumps in Capacities From 1 to 200 GMP; for Pressures to 1500 PSI; speeds to 3600 RPM.

TUTHILL PUMP COMPANY
941 East 95th Street, Chicago 19, Illinois
PUMPS FOR YOUR PURPOSE

12 NEW ¾" and 1" Norgren AIR LINE FILTERS

Make Norgren the most complete line available!

For ¼" through 1½" Pipe Sizes
Up to 300° F. Operating Temperature
Norgren
Removable Bowl
5 to 250 psi Operating Pressure
Automatic or Manual Drain
Highly Efficient Water Removal

REDUCE COSTLY WEAR ON YOUR AIR EQUIPMENT

...with Norgren Air Line Filters

- **Now, 98 Models to choose from**—¼", ⅜", ½", ¾", 1", 1¼" and 1½".
- **Abrasive Solids and Corrosive Liquids** are removed from air lines, reducing equipment wear, repair and replacement costs.
- **Transparent or Metal Bowls**
- **Choice of 4 Filter Elements**—74, 64 or 25 micron...5 micron available in some sizes.
- **Automatic or Manual Drain**

For complete information about Norgren Air Line Filters, call your nearby Norgren Representative listed in your telephone directory—or **WRITE FOR No. 900 CATALOG**

If it's Norgren...It's Dependable.

C. A. NORGREN CO.

3460 SO. ELATI STREET • ENGLEWOOD, COLORADO

CALENDAR

OF COMING SHOWS AND MEETINGS

Industrial Research Conference, sponsored by Columbia University, Dept. of Industrial and Management Engineering, Arden House, Harriman, New York .....June 1-6

Magnesium Association, West Coast symposium on magnesium applications in aircraft and missiles, Institute of Aeronautical Sciences Bldg., Los Angeles, Calif. .....June 4-5

American Petroleum Institute, Division of Production, midyear committee conference, Hollywood Beach Hotel, Hollywood, Fla. .....June 8-13

SAE Summer Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J. .....June 8-13

ASME Materials Handling Conference, Public Auditorium, Cleveland, O. .....June 9-12

Fourth International Automation Exposition and Congress, New York Coliseum, New York, N. Y. .....June 9-13

Third U. S. Congress of Theoretical & Applied Mechanics, Brown U., Providence, R. I. .....June 11-14

ASME Semi-Annual Meeting, Hotel Statler, Detroit, Mich..June 15-19

American Society for Testing Materials, 61st annual meeting, Hotels Statler and Sheraton Plaza, Boston, Mass. ....June 22-27

American Institute of Electrical Engineers, summer general meeting and air transportation conference, Statler Hotel, Buffalo, N. Y. .....June 22-27

Society of the Plastics Industry, Inc., Midwest Section Conference, French Lick-Sheraton Hotel, French Lick, Ind...June 26-27

Annual Sales Conference of National Machine Tool Builders' Association and American Machine Tool Distributors Association, Purdue University, Lafayette, Ind. .....July 28-Aug. 1

SAE National West Coast Meeting, Ambassador Hotel, Los Angeles, Calif. .....Aug. 11-14

American Petroleum Institute, OIC Steering Committee meeting, Hotel Statler, Boston, Mass. .....Aug. 14

American Astronautical Society, Inc., Annual Western Regional Meeting, Stanford University, Dinkelspiel Auditorium, Palo Alto, Calif. .....Aug. 18-19

Joint Heat Transfer Conference of ASME-AIChE, Northwestern U., Evanston, Ill. .....Aug. 18-21

Western Electric Show and Convention, Pan Pacific Auditorium, Los Angeles, Calif...Aug. 19-22

Enjay Butyl is used in the new Willys 'Jeep' FC-150 Truck—as weather strips, transmission mountings, small extrusions for doors.

ENJAY BUTYL

Improves performance, cuts costs in new 'Jeep'

The new Willys 'Jeep' "Forward Control" Truck features all-direction visibility. The more than 2,700 square inches of glass demanded a window-sealing material that would *stay* firm and weather-tight for the life of the truck. Supplier B. F. Goodrich Co. chose Enjay Butyl for weather-stripping because of its exceptional resistance to weather and aging. A tighter, longer-lasting seal is assured by the well-known vibration and shock-absorption qualities of Butyl—an important factor in this rugged-duty 'Jeep.'

Butyl offers improved quality at low cost. More and more automotive manufacturers are switching to Butyl. Today over 100 automotive parts are made with this modern rubber. For further information and expert technical assistance, write or wire the Enjay Company.

ENJAY BUTYL

Enjay Butyl is the greatest rubber value in the world. It's the super-durable rubber with *outstanding* resistance to aging • abrasion • tear • chipping • cracking • ozone and corona • chemicals • gases • heat • cold • sunlight • moisture.

ENJAY *Pioneer in Petrochemicals*

ENJAY COMPANY, INC., 15 West 51st Street, New York 19, N. Y.

Akron • Boston • Charlotte • Chicago • Detroit • Los Angeles • New Orleans • Tulsa

BENDIX SELF-ADJUSTING BRAKES ADD TO THE SAFETY AND ECONOMY OF THESE TWO GREAT CARS

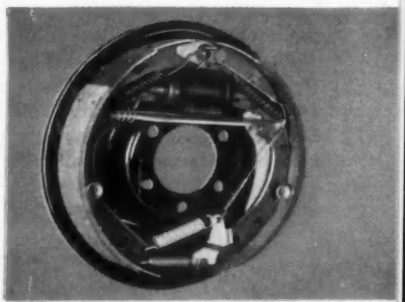
Mercury and Edsel for 1958 feature Bendix' latest development—brakes that adjust themselves!

The new Bendix* Self-Adjusting Brakes not only save the bother and expense of periodic brake adjustments but are safer, too. Stopping power is maintained at maximum because all four shoes are always correctly adjusted. And the driver is assured of effective brake applications because there is always maximum clearance between pedal and floor.

Reasons such as these make Bendix Self-Adjusting Brakes a real sales feature for any car. We predict you will hear more about them in the years ahead.

For over thirty years Bendix Products Division has demonstrated its ability not only to meet, but to anticipate the needs of the automotive industry. From four-wheel brakes to power braking and power steering, Bendix has pioneered and developed many of the industry's most notable advancements.

*TRADE MARK



When shoe clearance exceeds a predetermined amount, a ratchet sets up the star wheel adjuster one notch as the brakes are applied while the car is in reverse. This automatically compensates for lining wear, adjusting the shoes to exactly the right fit within the drum.

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Bendix AVIATION CORPORATION

AUTOMOTIVE INDUSTRIES

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High Spots of This Issue

Industrial Trucks Play Key Role

With the advance in automation, industrial trucks are assuming an increasingly important role in materials handling operations, particularly in automotive and aircraft plants. This report includes a brief survey of industrial truck usage by the five leading automobile manufacturers. Page 48.

Ford's Self-Contained Rawsonville Plant

The new Ford plant at Rawsonville, Mich., houses a variety of unrelated operations, yet it is completely self-contained. This report covers the entire plant layout, including integrated departments for making zinc and aluminum die castings, plus a powder metal department. Page 52.

Westinghouse Machine Tool Forum

New machine control devices and positioning systems as well as machine tool drives, servo system applications, machinability, and "space age" materials were among the topics discussed at the Westinghouse-sponsored 22nd Machine Tool Forum. Page 62.

Efficient Parts Handling at Evinrude Motors

The new Evinrude Motors plant assembles and ships 12 different models of outboard engine units. How plant engineers solved the problem of handling the entire range of models with the greatest efficiency and economy is told here. Page 66.

Production Control Equipment Cuts Costs

Hancock Manufacturing Co. has reduced production costs at its Jackson, Mich., plant by installing a completely new method of electro-mechanical control. What this new Telecontrol system does and how it operates is told here. Page 70.

'58 New Product Items And Other High Spots, Such As:

Hydraulic fan; Russian exhibits at Brussels Fair; Russian automatic transmission; report on farm equipment industry; Materials Handling Exposition; and industrial statistics.

AUTOMOTIVE INDUSTRIES COVERS
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shoes to exactly the right fit within the drum.

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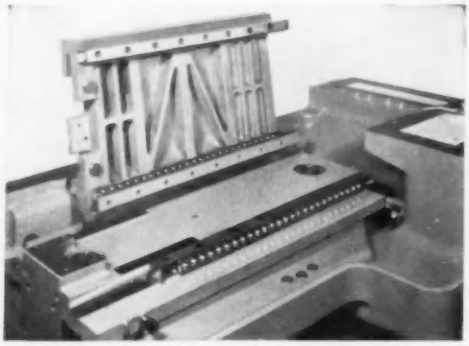
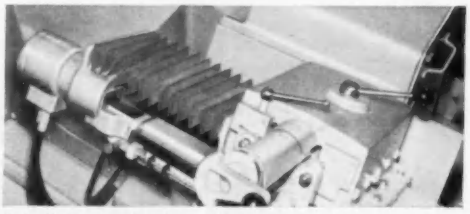


Anti-friction bearing slide, one of the biggest improvements in centerless grinding within the past few years, eliminates stick-slip and scoring.



Grinding wheel truing unit incorporates several features of high-quality construction, including bellows dust guard to protect the ways and hydraulic motor to actuate the unit.

Get acquainted with the new features incorporated in CINCINNATI FILMATIC No. 2 Centerless Grinders! You'll find that these machines now have a higher cost-reducing potential than ever before. ¶ Grinding wheel truing controls are located directly below and at the rear of the unit, right where the operator stands when truing the wheel. Short operators will like the adjustable ejector limit switch*, which ejects the work when using a partial arc of infeed lever movement. Also, new cutting fluid control and nozzle for work . . . new cutting fluid control for diamond . . . bed 5" longer for ample support of new truing units . . . both swivel adjusting screws (for correcting taper in work) located on front of machine. ¶ These new features and advantages are in addition to the reliable standbys such as FILMATIC grinding wheel spindle bearings; anti-friction infeed slide; infinitely variable regulating wheel speeds, and many more. Get a copy of catalog No. G-644-4, and you'll see why CINCINNATI FILMATIC No. 2 Centerless Grinders are the finest machines available for your new equipment program.

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News

OF THE AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 118, No. 11 **June 1, 1958**

Proposals for Tax Refunds Criticized by Big Three

The automobile companies loudly disagree with various diagnoses that chrome and high automobile prices are responsible for the current business recession.

And they disagree even louder with prescriptions that lower car prices would provide a quick and automatic cure to the industry's and the nation's ills.

From Washington have come proposals aimed at stimulating car sales by lowering Federal excise taxes. Automobile companies for years have advocated repeal of the 10 per cent Federal excise tax but the Big Three presidents have labeled current proposals from Senators Estes Kefauver and Paul Douglas as "impractical . . . unrealistic . . . undesirable . . . complicated . . . discriminatory."

Briefly, here is the situation: Sen. Kefauver has proposed a bill which would provide for a refund of half the excise tax if the manufacturer could show proof that the refund was passed on to the car buyer. Sen. Douglas has proposed that the excise tax be reduced from 10 to 2.5 per cent on the condition that manufacturers reduce their prices by an additional 6 per cent.

The three company presidents were asked by Sen. Kefauver to comment on his bill and on the Douglas proposal, which was made as a suggestion rather than as a House measure.

The company heads replied in separate letters, but they covered the same basic points: the excise tax had been enacted as an emergency measure and hence should be repealed since the emergency no longer exists; the refund would create unnecessary problems for manufacturer, dealer and customer; reduction of the tax should not be tied in with car price reductions, since this would have the effect of establishing government price regulation.

Other points brought out in the letters: any action should be prompt and retroactive so that prospective consumers are not deterred from buying now; there is no real indication that price reductions would stimulate sales proportionately.

Meanwhile, there was no official comment from the industry on another suggestion from Washington that 1958 models be continued another year. The idea behind this suggestion was to pass along to consumers a price reduction of about $250 per unit gained through changeover cost savings.

Tooling for 1959 already is nearly completed, so there would be no real economy in avoiding changeover, as suggested.

SOVIETS UNVEIL SEVEN-PASSENGER ZIL-111

Final version of the seven-passenger ZIL-111, made in Moscow, is powered by an over-square V-8 engine of 365 cu in. displacement rated at 220 hp at 4200 rpm. Bore and stroke are 3.93 in. and 3.74 in., and compression ratio is 9 to 1. Steering and brakes are power operated. Hub caps are spaced ¾ in. from the wheel rims and incorporate blower fins to provide extra cooling air for the brakes. Towing hooks are an integral part of the 150-in. wheelbase chassis. This 5680-lb model is 240 in. long, 81 in. wide and 65 in. high.

Chrysler Will Build in Ohio For Electrical Parts Output

Chrysler Corp. will build a plant in Findlay, O., for manufacturing electrical equipment and components. Although no plans have been announced for the plant, ground breaking is expected to take place some time this summer.

The Findlay plant will produce much of the electrical equipment which Chrysler now buys from Electric Autolite Corp. The two firms have an agreement under which Autolite will supply Chrysler through 1960.

NEWS AUTOMOTIVE AND AVIATION

Soviet Tchaika is powered by a V-8 engine

Soviet 7-Passenger Car Shown at Brussels Fair

The Soviet Tchaika, now on display at the Brussels World Fair (see illustration), is powered by one of Russia's first V-8 engines—a 293 cu in. unit developing 180 hp at 4600 rpm.

The Tchaika—or Seagull—is equipped with a four-barrel carburetor and has a 8.5 to 1 compression ratio, which is designed for 92-octane gas.

The automatic transmission is controlled by a cluster of pushbuttons on the instrument panel, and steering, brakes and windows are power operated.

The car has a pedal type parking brake and tubeless tires. Trim is in chrome and gold (anodized aluminum grille).

The seven passenger model is 223 in. long, 80 in. wide, 62 in. high, and weighs 3960 lb. It is intended to replace the ZIM limousine, and full production at the Gorky factory will start at the end of this year.

Power Steering Pump Assembled By Chrysler in Pressurized Room

Pumps for Chrysler's Constant Control power steering units are assembled in a pressurized room where assemblers can work with close tolerances in a dust-controlled atmosphere.

The assembly room at the corporation's Highland Park, Mich., plant was designed and constructed especially for the job. The valve that controls oil flow in the pump requires a tolerance of .0002 in. Magnets and air gauges are used to test parts.

The room, 75 by 80 ft, has sealed walls and a special floor of dry sand topped with cement and a plastic sealer.

S-P Reports Quarter Loss, Will Gamble on Small Car

Studebaker-Packard Corp., reporting its loss for the first quarter was $3.8 million greater than a year ago, will stake its future on a new small car (see AI May 15, p. 34).

The company's net loss for the first three months was $6,294,480. A year ago it was only $2,498,357. The current loss rate is well below that of 1956, however, when S-P lost $14.3 million the first period.

S-P President Harold E. Churchill announced at the stockholders meeting that his company was planning a small car for fall introduction. The financial report, however, came later.

An encouraging part of the report was the working capital of $47.7 million, which S-P can use for tooling costs for its 108-in. wheelbase car. While reporting operating losses regularly every period, the company has maintained working capital at the $50 million level.

S-P may well decide—or has decided—to take the big step made by American Motors last year in dropping the slow selling prestige cars. AMC abandoned Nash and Hudson, two venerable names, to concentrate on Rambler. Rambler sales are running about 70 per cent ahead of last year.

S-P could drop the Packard and the larger Studebakers and put all of its sales, engineering, advertising and service efforts behind its small car. In the first three months of 1958, only 830 Packards were registered.

NEW WILLYS CARRIER SHOWS ITS VERSATILITY

Willys test drivers demonstrate the versatility of the new ¾-ton platform-type combination personnel and cargo carrier developed by Willys Motors, Inc. (see AI, May 1, 1958, p. 94). An outgrowth of the Mechanical Mule, the vehicle carries six men and may be converted quickly into a weapons carrier by folding the seats flush into the platform bed. Army Ordnance has ordered one for testing purposes.

AMC Boosts Rambler Output For Fourth Straight Week

American Motors, the exception to the rule, boosted Rambler production for the fourth straight week when it scheduled more Saturday work at Kenosha for the third week of May.

In consecutive weeks, the company increased production schedules from 600 to 660, then to 700, then to 750 units a day. The increased overtime would put the daily average slightly higher than 750 cars.

The mosts recent increase followed a 10-day report of 4932 Ramblers sold.

Ford also scheduled a production increase for its Thunderbird. Output is scheduled to be 300 units a day, beginning in June.

Chevrolet and Ford Agree That Luxury Models Are Doing Well

Chevrolet and Ford agree on one point that is vital in studying the current automobile market and the recession. The two competitors, traditional leaders in the low price field, are leaning heavily on their luxury models to maintain present sales levels.

The success of the high priced Ford and Chevrolet cars indicates that car buyers are not price-shy.

Representatives of both divisions recently spoke up in defense of the industry, which has been blamed by many in recent weeks for causing the recession with too-high car prices.

Benson Ford, vice-president of Ford Motor Co. and chairman of the Ford Dealer Policy Board, said recently that the automobile industry is the victim of the current recession, and not the cause of it. Sales figures, he pointed out, show that the industry lag actually followed by several months the downturn in the economy.

He revealed that 61 per cent of current Ford automobile sales are in the highest price Fairlane and station wagon series.

And the Thunderbird, which costs even more, is selling so well that the factory is boosting its production rate in June to 300 units a day, six days a week.

At Chevrolet, general manager E. N. Cole pointed out that Impala sales are accounting for 16 per cent of the division's total. With the Corvette, convertibles and four-door station wagons, the higher price Chevrolets are taking one-third of division sales.

J. O. Wright, Ford vice-president and division general manager, added that, of the customers who are buying the lowest price Custom 300 series, 76 per cent are paying extra for a gold anodized side trim.

Corvette sales are running 40 per cent ahead of last year, according to Cole, and currently the sales rate figures out to 10,000 units for the year. Top of the line models, excluding the new Impala, are running three per cent better than a year ago.

Ford appears to be in for further upgrading. In 1960, the Thunderbird will become a part of the regular Ford line of cars, and the Thunderbird styling concepts will be carried throughout the line.

Benson Ford said that the American manufacturers will continue to build the kind of car that the consumer wants, adding that the small European car penetration will level off at about 5 per cent.

An interesting sidelight to the upgrading of the traditional low priced cars is the effect on the middle-priced field. Only Oldsmobile, among the middle group, shows an increase in penetration over last year, although registrations actually are below a year ago.

As one observer remarked recently, the middle-priced field is not disappearing (although two makes are dropping their top series in 1959). The middle price field merely lists more names than before, including Ford and Chevrolet, with their luxury models.

FORD TEST TRACTOR STEERS ITSELF

A tractor that steers itself electronically around an obstacle course was developed for use at Ford Motor Co.'s Farm Machinery Research and Engineering Center, Birmingham, Mich. Sensing antenna between the front wheels pick up an electrical beam from a small wire buried in the test track to control the tractor's steering system. A second antenna under the tractor gets start-stop signals which are also sent over the wire, and control the tractor's clutch and brake. The device is designed to relieve test drivers from the fatigue and hazards of the equipment "torture" course.

FWD TRACTOR

New FWD Tractioneer, built by Four Wheel Drive Auto Co., is designed for pulling trailer combinations in 11 western states, but it is also adaptable for use in other sections of the country. The two-axle tractor features a 59-in. standard C.O.E. cab and is powered by a 220-hp Diesel engine. It has a 115-in. wheelbase and weighs under 11,000 lb.

NEWS AUTOMOTIVE AND AVIATION

GERMAN TRACTOR-TRUCK HAS FOUR WHEEL DRIVE

Kramer Allrad tractor-truck with 84.6-in. wheelbase is powered by a Deutz 54-hp air-cooled Diesel driving all four wheels. The all-synchronized and reversible eight-speed transmission in two ranges permits creeping at 0.9 mph and road speeds up to 37.5 mph. Other features of this German vehicle include differential locks on both axles, independent power-takeoff drive, and reduction gearing in each wheel hub to give minimum ground clearance of 17.7 in. Optional power steering is available.

How Low Can Automobiles Go? Three Engineers Give Answers

Three automotive engineers, one each from Chrysler, Ford and General Motors, told the Detroit section of SAE recently their views on how low the tomorrow's cars can go, and what will have to be done to lower the rooflines.

William M. Schmidt, executive stylist at Chrysler, said the trend in all contemporary design is toward lowness, but the American passenger car can never get any lower than 48-52 in. and still provide road clearance as well as room for comfortable seating.

Schmidt said the automobile can be lowered to the 48-52 in. limit by relocating the transmission, or possibly using a rear engine, or perhaps front wheel drive.

Harold W. Johnson, executive engineer, M-E-L advanced engineering, explained how unitized construction was used in achieving lowness in the 1958 Lincoln, particularly in providing interior room for passengers.

Philip O. Johnson, engineer in charge of physical testing at Fisher Body Div., said he felt the critical factor affecting car height today is the tunnel and drive train. Six-passenger cars cannot be lowered to the limit until the drive tunnel is eliminated, he said.

Rear transmission or front wheel drive could eliminate the tunnel, it was pointed out.

Edsel Styling Will Show Up On Other Cars, Ford VP Says

The radical styling of the 1958 Edsel, called by many the reason for Edsel's slow start, may be spreading to other makes. George W. Walker, Ford vice-president and director of styling, says that the vertical grille and the horizontal "gull wing" effect of the rear deck will be "present in some form" in several competitive 1959 models.

As for Edsel itself, according to Walker the same basic styling theme will be carried through 1959, although stylists are working on more "dramatic" ideas for the years beyond.

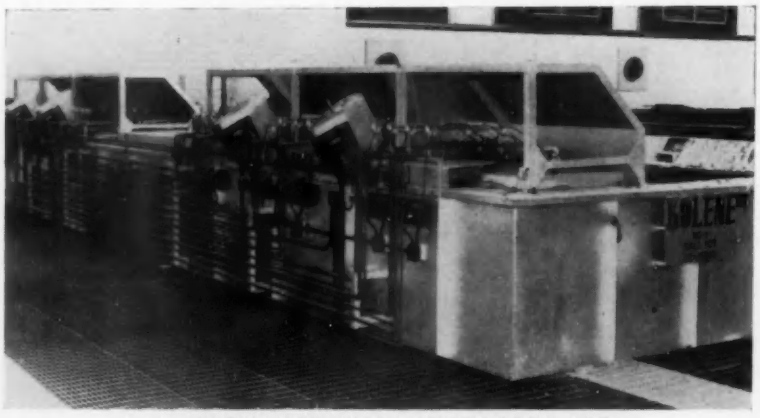
The vertical front end treatment found on other 1959 cars would not necessarily have to come from the grille. Headlamp arrangement could give a vertical suggestion while maintaining the horizontal grille.

Edsel, incidentally, registered 11,903 cars during the first quarter of 1958, or 1.07 per cent of the industry total.

Senate Committee Releases Profit Figures for Ford, GM

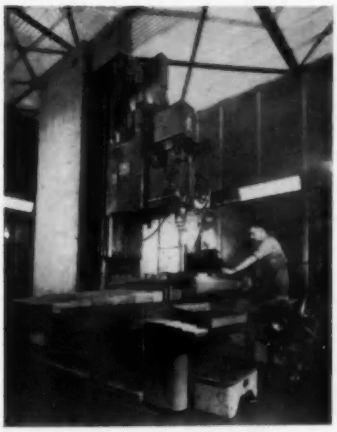
The Senate Anti-Trust and Monopoly Subcommittee has released unit profit information supplied earlier by Ford and General Motors. The two companies submitted the figures last January during a Senate investigation of automobile pricing practices.

Ford's average profit per unit was $88 in 1954, $143 in 1955, $85 in 1956 and $84 in 1957. GM's average profit was $153 in 1954, $209 in 1955, $162.40 in 1956 and $150.06 in 1957.



SALT BATH TANK HAS LARGE WORK AREA

This molten salt bath tank is part of a new seven tank pickling line now operating at International Nickel Co.'s Huntington, W. Va., works. The tank was built by Kolene Corp. and has a work area 42 ft long, 5 ft wide, and 6 ft deep. It is used to descale, degrease, and deglass tubes, rods, shapes, wire and strip. Carbonates and insolubles settle out into a sludge collection zone located outside the work area. Twenty-four gasfired immersion tubes maintain the bath at 900 F. All operating features are located on one side.



GIANT JIG BORER

Pratt & Whitney inspectors check every operation of 26-ton 4EA Electrolimit jig borer before it is shipped to Pratt & Whitney Aircraft Co., where it will be used to speed production of advanced type aircraft power plants. The machine can accommodate workpieces as high as 70 in. and can bore to the center of a workpiece 80 in. in diameter. All models incorporate P&W's Electrolimit measuring system.

NSMPA Leaders Predict Industry Upturn by 1960

The year 1958 will be a slow one for the screw machine parts industry and the next year won't be much better, but an upturn is expected in 1960.

That's what industry leaders told the National Screw Machine Products Association meeting in Chicago recently. About 300 members attended, the second highest registration in the association's 25-year history.

Members reported a spotty business situation in the industry and predicted a gradual rise this year to an index of about 168. Last year's index was 176, down five per cent from 1956. This is a continuation of the slow decline from 1953 highs, it was pointed out. The low was reached in November-December with an index of 136.

Liquidations of screw machine capacity in recent months totaled around $15 million, it was stated. In the event of a general business upturn, it was predicted, this reduced capacity should be reflected in a definite improvement in the situation of shops now in business.

Borg-Warner Reports Decline In Quarterly Sales, Earnings

Borg-Warner Corp. has reported a decline in both sales and net earnings for the first quarter of 1958. Sales dropped from $164,816,511 a year ago to $130,804,835. Net earnings fell from $9,022,444 to $5,015,997.

AI TABLOID

Hamilton Div. of Baldwin-Lima-Hamilton Corp. opened a new test laboratory to do research and development work in parts compacting of such materials as metal powders, abrasives, carbides, cermets, ferrites, plastics, nuclear fuels, and solid fuels for rockets and missiles.

* * *

Renco-Toledo, Inc., manufacturer of machine tool automation devices, has been purchased by Cleveland Pneumatic Industries and will become known as Renco-Aire Div. Operations of the new division will be moved to a Cleveland Pneumatic facility in Kalamazoo, Mich.

* * *

Dayton Steel Foundry Co. acquired the Sterkel Tandem V-Belt Drive Mfg. Co. of Denver, Col., and will operate it as a new subsidiary called Dayton Tandem V-Belt Drive Co.

* * *

Goodrich - Gulf Chemicals, Inc. reports it has developed a new type of dry man-made rubber containing carbon black, which is highly abrasive resistant. The company is now building additional facilities at its Port Neches, Tex., plant to manufacture the new product.

* * *

A new process for producing ductile molybdenum by directly reducing molybdenum sulfide with tin has been developed by H. Gordon Poole, of the Colorado School of Mines, and J. S. Nachtman, consulting engineer. The new process is said to make possible for the first time the fabrication of ductile molybdenum parts by powder metallurgy techniques or more conventional rolling and extrusion methods.

* * *

National Cylinder Gas Div. of Chemetron Corp. (formerly National Gas Cylinder Co.) is building a $3 million liquid oxygen, nitrogen and argon plant near Philadelphia. The plant will supply oxygen through a direct pipeline to the Conshohocken, Pa., plant recently announced by Alan Wood Steel Co. for use in its new H-iron process of iron powder production.

Yale Materials Handling Div., Yale & Towne Mfg. Co. developed a supercharged hydraulic system for lift trucks that it says eliminates surging in the hydraulic tank and the danger of getting air bubbles into the lines and pump. The new system will be standard in all Yale rider-type gas, LP-Gas, and electric-powered lift trucks.

* * *

Eriez S. A. Productos Magneticos e Metalurgicos, a new million dollar plant owned jointly by W. R. Grace Co. and Eriez S. A., is now in operation at San Paulo, Brazil. The plant will produce basic magnetic materials and equipment for the South American market.

* * *

Canadian engineers report they have produced a plastic wheel designed for use as a load-carrying wheel on army tracked vehicles. The wheel weighs 80 lb, has an overall diameter of 23 in. and is said to be capable of taking 3000 lb radial thrust and 3000 lb axial thrust.

* * *

Minneapolis-Moline Co. has organized a contract manufacturing division to serve other manufacturers and suppliers in the production of forgings and castings, sheet metal, automatic screw machine, and general machine products.

* * *

Brush Beryllium Co. has received what is said to be the largest commercial contract ever made for fabricated beryllium metal. The contract totals $1.2 million and calls for two core matrices for a high-flux materials and engineering test reactor now under construction at Mol, Belgium, for Centre d'Etude de l'Energie Nucleaire, Belgium's principal nuclear research group.

* * *

Linde Co., Div. of Union Carbide Corp., is building its largest on-site oxygen plant at the Duquesne Works of U. S. Steel Corp. Production will be at the rate of 730 million cu ft a month, and distribution will be made by pipeline to three other U. S. Steel plants—Homestead; Edgar Thomson; and National Works, National Tube Div.

AVIATION MANUFACTURING

BOEING 707 TRANSPORTS SHOWN IN FINAL ASSEMBLY

The mounting production tempo of Boeing 707 jet transports for commercial airlines is shown in this recent photo of the final assembly area of the Transport Div. at Renton, Wash. First deliveries of the 707s are scheduled to be made later this year. To date, a total of 164 jet transports have been ordered by 15 airlines.

New High-Temperature Alloy Developed by Westinghouse

A new "predesigned" high-temperature alloy that is expected to raise the operating temperatures of jet engine turbine blades to 1800 F has been developed by Westinghouse Electric Corp. scientists.

The alloy, known as Nicrotung, gets its name from three of the essential metals that compose it—nickel, chromium, and tungsten.

Dr. C. E. Arntzen, manager of the Westinghouse materials engineering departments, said the new alloy resulted from a unique Westinghouse approach to materials development. "This approach," he explained, "calls for 'predesigning' materials from basic theoretical information rather than employing the laborious and time-consuming cut-and-dry methods generally employed."

Although Nicrotung is still in the first stage of development, early tests have shown that it meets the basic requirements of an 1800 F turbine blade material. Among these requirements, Dr. Arntzen listed castability, oxidation resistance, stress-rupture strength, and ductility.

He said the alloy has been prepared on a pilot plant scale at the Westinghouse materials manufacturing department at Blairsville, Pa., and ow is undergoing exhaustive tests at the company's aviation gas turbine division in Kansas City.

Dr. J. T. Brown, Westinghouse metallurgist who developed the new alloy, said its breaking strength at room temperatures is about equal to that of a good grade of structural steel. However, at the near-white-hot temperature of 1700 F, according to Dr. Brown, Nicrotung withstands a stress of 32,000 psi for as long as 100 hours without failure and a stress of 22,000 psi at 1800 F for the same amount of time. At such temperatures, Dr. Brown said, structural steel would have less than one per cent of Nicrotung's strength.

Lockheed Gets Research Award For Turbine-Powered ASW Plane

Lockheed's California division has received a Navy research contract for $2 million to develop a turbine-powered anti-submarine bomber.

Burt C. Monesmith, Lockheed vice-president and manager of the California Div., said the new plane—a military version of Lockheed's prop-jet Electra—will be powered by four Allison T56A engines developing a total of 16,200 hp at take-off and will cruise nearly 100 per cent faster than the Lockheed Neptune, which combines both conventional and jet power.

The fuselage will include a plastic tail "stinger" housing a MAD unit, which seeks out submerged metallic objects by noting any deviation in the normal magnetic fields. The Neptune —today's standard ASW airplane—is similarly equipped.

Mr. Monesmith said that a prototype of the turbine-powered ASW plane will be flying in August.

Boeing Sales and Earnings Up in First Quarter of '58

Boeing Airplane Co. sales for the first quarter of 1958 totaled $411,-051,648, compared with $292,711,969 for the same period a year ago. Earnings amounted to $9,499,190, compared with $8,075,464 for the first quarter of 1957.

William M. Allen, president, reported that the company's backlog on March 31 totaled $2,880,000,000, compared with a backlog of $2,452,000,-000 at the end of 1957. About $813,-300,000, or 28 per cent of this amount, he said represents orders for commercial jet transports.

Study Reveals Aluminum's Role In Nation's Missiles Program

About 80 per cent of the missiles for which information is available use aluminum for structural purposes. Usages range from aluminum bobbins holding the guidance wire of the Army's anti-tank Dart to the integrally stiffened aluminum skin of the Air Force Titan.

Vanguard, the Navy's satellite vehicle, uses about 3700 lb of aluminum out of a total of 22,600 lb. Of the 40,000-lb Redstone, 4500 lb of aluminum are used, representing 90 per

cent of the missile's airframe weight. Snark, the Air Force surface-to-surface missile, uses 3900 lb of aluminum.

These and other facts about the vital role aluminum is playing in the production of missiles are revealed in a study just completed by Kaiser Aluminum & Chemical Corp.

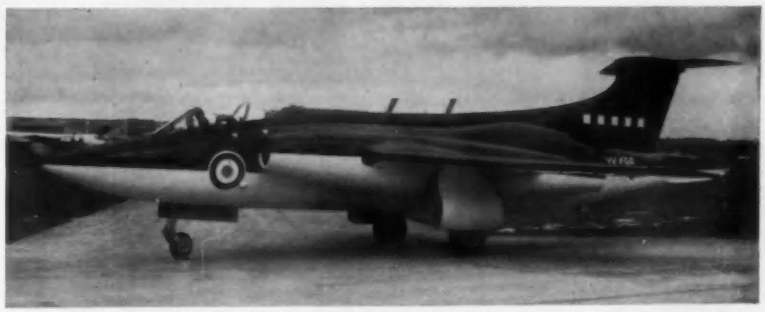
The study shows that the use of aluminum tends to increase in newer models of existing missiles. The Navy's 350-lb air-to-air Sparrow III, for example, uses 260 lb of aluminum compared with only 95 lb for the 300-lb Sparrow I.

The study also revealed that aluminum is being used increasingly as a component in solid fuel systems for missiles. The solid fuel motor for the Navy Polaris, for instance, uses a composite fuel made up of very fine aluminum powder in combination with conventional polymer bindings. The fuel is encased in aluminum firing chambers to increase the heat.

The Army Hawk, a surface-to-surface interceptor, uses a solid fuel of which about 15 per cent by weight is powdered aluminum.

But it is in the ground equipment required by missile systems that the metal may find its greatest use, according to the Kaiser study. Tactical missiles must be readily portable and in most cases capable of being airborne, the study said; and for this purpose a number of ingenious containers have been built which take advantage of aluminum's light weight, durability, and ease of maintenance in field storage.

The so-called "heat barrier" does not present a serious barrier to the potential use of aluminum, the Kaiser study said. Because such temperatures are beyond the capabilities of any metals it seems more likely, the study found, that a solution will be found through redesign of flight paths and through skin-cooling devices.



BLACKBURN STRIKE AIRCRAFT COMPLETES FIRST FLIGHT

First Blackburn NA.39 Naval Strike Aircraft completed its first flight recently at Bedford Airfield in England. The plane is powered by two de Havillland "Gyron Junior" turbo-jet engines and is said to be the first in the world to embody full area rule design. It also features integral construction, in which the structure is largely machined from the solid, and boundary layer control.

Lockheed Sales, Earnings Up Sharply in 1st Quarter

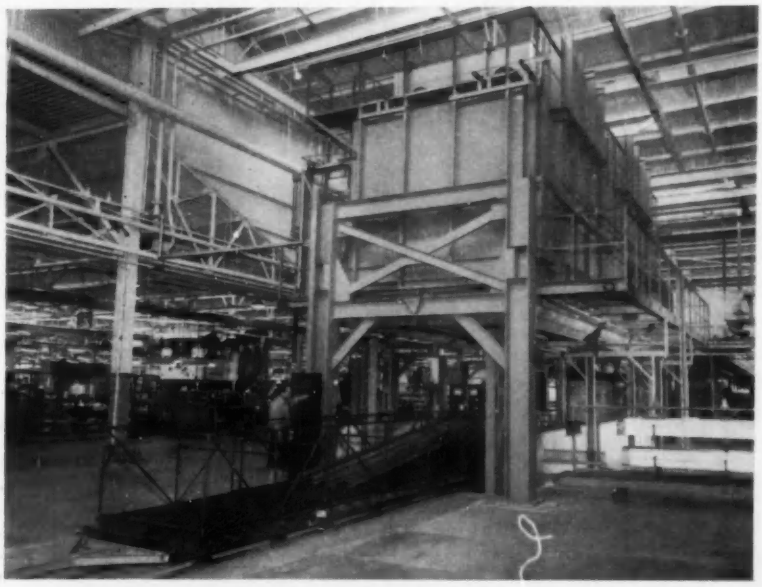
Sales and earnings of Lockheed Aircraft Corp. rose sharply in the first quarter of 1958, Robert E. Gross, chairman, told stockholders.

First quarter earnings totaled $5,076,000, up almost 50 per cent over the $3,415,000 figure for the same period in 1957. Sales amounted to $238,670,000, an increase of 22 per cent over the $195,479,000 total a year ago.

Sales for the next three quarters, Gross predicted, will be lower than for the first period. He forecast that 1958 sales would reach about $800 million, compared with total sales of $868,315,000 in 1957.

Gross attributed the sharp rise in sales to the increased volume of missile and satellite development work and to the rise in commercial deliveries of Super Constellations, Model 1649 Starliners, and spare parts.

The company's backlog on March 30, he reported, amounted to $1,251,523,000, down 18 per cent from the $1,533,469,000 a year earlier but only 2 per cent below the year-end total of $1,280,000,000.



ALUMINUM HEAT-TREAT FURNACE INSTALLED AT CONVAIR

This aluminum heat-treat furnace, said to be the largest in the aircraft industry, is helping to turn out parts for the Convair 880 jet transport. It was built for Convair (San Diego) Div. of General Dynamics Corp. by Despatch Oven Co., and can handle extrusions up to 40 ft long. Here the electric car mover pushes a work basket onto the hydraulic elevator. The big oven is overhead; the quick quench pit below.

Bendix-Pacific Is Making Systems for 20 Missiles

Components and systems for 20 U. S. missiles will account for more than half of 1958 sales at Pacific Div. of Bendix Aviation Corp., according to general manager R. C. Fuller.

Fuller reported that work on the missile projects will make up 54.4 per cent of the division's sales this year, with aircraft components accounting for 24.7 per cent, and submarine and surface craft work for 16.5 per cent.

(*Turn to page 94, please*)

MEN IN THE NEWS

Ramo - Wooldridge Corp.—Allen F. Donovan was elected vice-president and director of the Aeronautics Laboratory.

Willys Motors, Inc.—**Paul J. Steil, C. W. Moss,** and **Dean B. Hammond** were elected vice-presidents, and **L. O. Staelens** has been named controller.

American Motors Corp., Automotive Div.—**G. A. Donat** has been promoted to assistant merchandising manager.

Sheffield Corp.—**Oscar Ahlers** has been named general manager.

Detroit Power Screwdriver Co.—**Robert F. Gladfelter** has been elected president and **John M. Small** has been elected vice-president, treasurer and a director.

Aro Equipment Corp.—**John R. Markey** was elected secretary.

Olin Mathieson Chemical Corp.—**Richard E. Clay** has been appointed manager, automotive sales for the Aluminum Division.

Hercules Motor Corp.—**Robert E. Gottron** has been appointed manager of foreign sales, and **Robert H. Bragg** has been named supervisor of material control.

International Nickel Co. of Canada, Ltd.—**Frederick F. Wood** has been elected assistant to the vice-president—publicity and advertising; and assistant vice-president—publicity and advertising of International Nickel Co., Inc., the company's U. S. subsidiary.

McKay Machine Co.—Edwin B. James was appointed vice-president, sales.

American Metal Products Co.—R. J. Williams was named executive vice-president and Andrew M. Mras was made president.

Gisholt Machine Co.—**Edward C. Helmke** was appointed chief engineer.

Buick Motor Div., General Motors Corp.—**Glenn D. Wilson** was named manager of Buick retail operations, and **Richard B. Cogswell** succeeds him as head of the merchandising department.

Curtiss-Wright Corp., Utica Div.—**John C. Hammelef** was named industrial sales manager for Mercedes-Benz Diesel engines.

Allis-Chalmers Mfg. Co.—**Richard L. Engel** is now manager of the Industries Group Pacific Region.

Vickers, Inc., Aero Hydraulics Div.—**Walter K. Deacon** has become chief engineer, Torrance Plant.

General Motors Corp., Euclid Div.—**D. B. Currence** was named Southern regional manager.

E. I. du Pont de Nemours & Co., Inc.—**W. Allen Taft** has been named director of sales of the Petroleum Chemicals Div.

Chrysler Corp.—**A. W. Hartig** was named manager of the Axle and Transmission Div.

Minneapolis-Honeywell Regulator Co.—**Harvey W. Odom** has been named sales manager of the industrial branch office in New Orleans, La.

Cessna Aircraft Co.—**Robert L. Sutton** was appointed director of market research.

Besly-Welles Corp.—**Edward K. Welles** was elected chairman of the board and chief executive officer, and **Warren C. Olson** was elected president and chief administrative officer.

Twin Coach Co.—**W. G. Ritzer** was named treasurer.

LeTourneau-Westinghouse Co.—Louis A. DePolis, has been named vice-president in charge of marketing.

Standard Products Co.—**F. Russell Valpey** was elected president.

Philips Electronics, Inc.—**Arie Vernes** was elected president, succeeding **Pieter van den Berg,** who was elected chairman of the board.

Tidewater Oil Co.—**David T. Staples** was recently elected chairman of the board, and **George F. Getty II** succeeds him as president.

Lockheed Aircraft Corp., Georgia Div.—**W. A. Pulver** has been named chief engineer.

ACF Industries, Inc., Carter Carburetor Div.—**Kenneth D. Johnson** has been appointed vice-president of manufacturing.

Olin Mathieson Chemical Corp., Aluminum Div.—Richard E. Clay has been appointed manager, automotive sales.

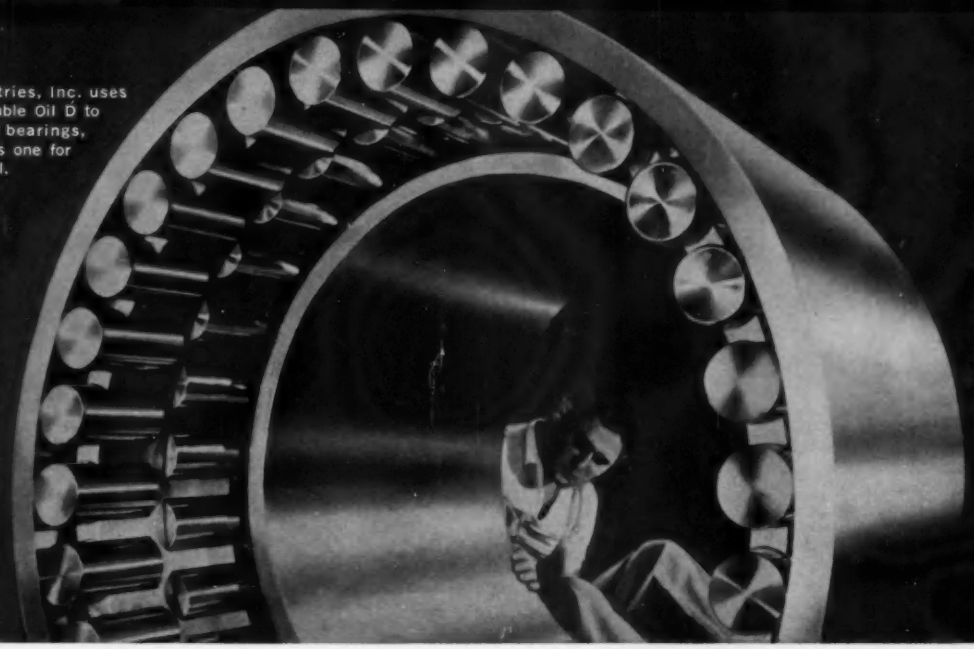
Sylvania Electric Products, Inc.—**Merle W. Kremer** has become vice-president and general manager of the Parts Div., and **Gerald L. Moran** was made vice-president and general manager of the Chemical and Metallurgical Div.

Electric Furnace Co.—**C. L. West** was elected chairman of the board.

Standard Products Co.—**Charles W. Duffy** was elected a vice-president and director.

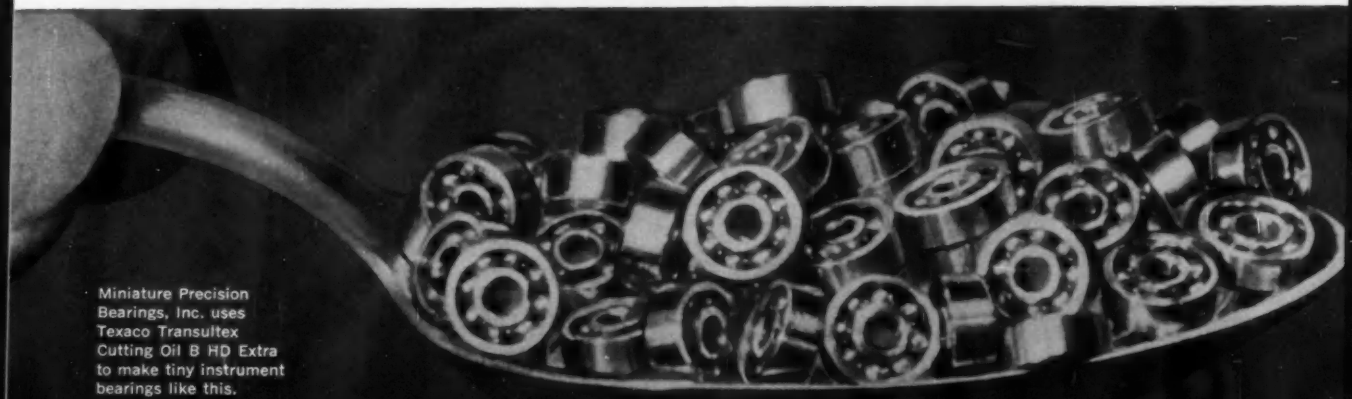
Harrill Corp.—**Paul E. Berndt** has become vice-president in charge of engineering and manufacturing.

(*Turn to page* 43, *please*)



SKF Industries, Inc. uses Texaco Soluble Oil D to make giant bearings, such as this one for a rolling mill.

WHAT SIZE IS YOUR MACHINING PROBLEM?



Miniature Precision Bearings, Inc. uses Texaco Transultex Cutting Oil B HD Extra to make tiny instrument bearings like this.

If you make anti-friction bearings of any size, you need grinding fluids that prevent rust and produce uniformly fine finishes. These fluids must also take into account the bearing material and the operating condition of your machines. They must have specific stability, cooling properties and ability to settle grinding dirt quickly. Otherwise your production drops and the number of rejects rises.

The makers of the small and large bearings shown above get fine bearing finishes and high production by using Texaco. There is a complete line of Texaco Cutting, Grinding and Soluble Oils to help improve machining on every job.

Take this tip. Use Texaco Cutting, Grinding and Soluble Oils—they'll help you produce faster, better and at lower cost, whether your product is the largest or the smallest.

Let a Texaco Lubrication Engineer suggest the best ones for your jobs. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

ROBERT A. NYQUIST, CHIEF CHEMIST
THE ELECTRIC AUTO-LITE COMPANY
BAY MANUFACTURING DIVISION
BAY CITY, MICHIGAN

"In our aluminum anodizing operation, we were encountering excessive gassing from our 15-18% sulphuric acid solutions.* In addition, we were getting a severe sulphate build-up on our lead cathodes and copper bus which was hindering our current carrying capacities. We couldn't control this problem even with our push-pull ventilation, so we began looking about for an effective method of suppression. And we found it!

"With the addition of just *one pound* of Udylite 'Zero-Mist' per 1,000 gallons of anodizing solution, we now control sulphuric mist and hold the spray down to 2-3 inches from top of the solutions. This was checked by saturating filter papers with alkaline phenolpthalein solution and suspending the papers at various levels before and after the addition of 'Zero-Mist' (see inset). The addition of 'Zero-Mist' made necessary by dragout is easily determined by visual and nasal observations. This easily maintained additive is our simple solution to an otherwise difficult processing problem."

Using Udylite 'Zero-Mist' in the anodizing operations such as the Electric Auto-Lite installation, is just one more application for the versatile 'Zero-Mist' family. Let your local Udylite representative demonstrate the many time and money saving advantages of 'Zero-Mist' at your convenience. Call him now, or write direct to:

*Zero-Mist has proven satisfactory in Chromic acid solutions also.

the udylite corporation

detroit 11, michigan • world's largest plating supplier

MEN IN THE NEWS

Russell, Burdsall & Ward Bolt and Nut Co.—Harry O. McCully was elected senior vice-president and W. Gould Jones succeeds him as vice-president in charge of sales.

Continued from Page 40

Borg-Warner Corp.—**L. G. Porter** was elected president and general manager of Long Mfg. Div. and Long Mfg. Co. Ltd. of Canada, a subsidiary.

Chrysler Corp.—**Louis B. Kazmerowski** has been appointed production manager and **Louis J. Pace** general production manager of the Newark, Del., plant.

E. W. Bliss Co., Press Div.,—**J. L. Case** was named Detroit district sales manager, succeeding **F. P. O'Keefe,** retired.

Goodyear Tire & Rubber Co.—**John E. McDonald** was made manager of the tire service compounding.

Dodge Div., Chrysler Corp.—**Stephen J. Tompkins** has been named chief engineer and director of Truck Product, and **George W. Gibson** was made chief engineer of Car Product.

Firestone Tire & Rubber Co.—**Richard V. Short** was named manager of the Richmond, Va., sales district.

Clearing Machine Corp., Div. of U. S. Industries, Inc.—**Albert J. Wilhelm** has retired as vice-president in charge of manufacturing.

General Electric Co., Metallurgical Products Dept.—**John P. Rubie** has been appointed manager-materials of the Magnetic Materials Section.

American Bosch Arma Corp.—**Charles F. Hoell** was appointed controller.

Vickers, Inc.—**Donald Rhodes** has been made district sales manager at Rochester, N. Y., and **Al Trail** is now district sales manager of the Cleveland office.

Clark Equipment Co., Brown Trailer Div.—**W. Z. Davis** was made manager of the western area; **R. P. Whelan,** manager of central; and **John Leveille,** manager of the eastern area.

Yale & Towne Mfg. Co., Yale Materials Handling Div. — **Francis J. Dunleavy** has been named manager of the Philadelphia plant.

Jones & Laughlin Steel Corp., Warehouse Div.—**William R. Mundy** has been promoted to manager of stainless steel products.

Oakite Products, Inc.—**Edward D. Hanagan** has been named controller.

White Motor Co., Diamond T Div. — Z. C. R. Hansen was named executive vice-president and general manager.

Magnethermic Corp.—**James K. McLaughlin** was named general sales manager.

Allis-Chalmers Mfg. Co.—**Alexander Dreisin** was made chief engineer, Fuel Injection Dept., at the Harvey, Ill., works.

B. F. Goodrich Chemical Co.—**Joseph P. Piers** has been named to head the production department at the new general chemicals plant in Henry, Ill.

Flexonics Corp.—**Robert M. Burnett** has been appointed planning coordinator and assistant to the president.

Westinghouse Electric Corp., Gearing Div.—**F. Richardz** has been appointed consulting specialist, gearing products; **R. L. Mathias,** engineering manager; and **R. H. Timmons,** manufacturing manager.

Cincinnati Milling and Grinding Machines, Inc.—W. K. Mathias and Philip O. Geier, Jr., were elected vice-presidents.

Borg-Warner Corp. — **Robert E. Kemelhor** has been named manager of future product planning and development for both Pesco Products and Wooster Divs.

Norton Co.—**Robert G. Van Keuren** was appointed head of the newly formed Product Engineering Dept. and Frank G. Gustafson was named supervisor of sales engineering.

Milwaukee Valve Co.—**Carl E. Rowe** has been elected president succeeding Louis Putze, who retains presidency of Controls Co. of America, the parent firm.

Necrology

Edmond E. Lincoln, 70, retired economic consultant to E. I. du Pont de Nemours & Co., died May 14, at Wilmington, Del.

Henry C. Doss, 72, former vice-president in charge of sales of Nash Motors Div, American Motors Corp., died May 10, at Memphis, Tenn.

James D. Glenn, 52, former vice-president and general manager of sales for Crucible Steel Co. of America, died May 8, at Pittsburgh Pa.

Melvin F. Keating, 56, a vice-president of Wesley Steel Treating Co., died May 6.

Lyle G. Hall, 71, former president of Stackpole Carbon Co. and treasurer at the time of his death, died Apr. 28, at Honolulu, Hawaii.

Photo: Courtesy Sikorsky Aircraft Division, United Aircraft Corp., Bridgeport, Conn.

Special Quality Ostuco Tubing HERE

meets exacting specifications for Sikorsky

SALES OFFICES:
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MOLINE
NEW YORK
NORTH KANSAS CITY
PHILADELPHIA (Wynnewood)
PITTSBURGH
RICHMOND
ROCHESTER
ST. LOUIS
ST. PAUL
ST. PETERSBURG
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Strength, lightness, concentricity, *highest metallurgical quality* — just some of the rigid requirements set up by Sikorsky for seamless steel tubing used in tail rotor drive shafts for S-55 Marine helicopters. Sikorsky engineers demanded a tube with special O.D. and wall tolerances, special straightness and suitable for 100% Magnaflux inspection to Sikorsky's own stringent specifications.

Ohio Seamless engineers and metallurgists tackled the problem and met these rigid mechanical and magnetic quality standards — with "Ohio Special Quality" tubing.

Even if you don't make helicopter components, this actual case history may trigger your imagination. We'd like to tell you more about Ostuco Tubing. Just contact our nearest sales office, or the plant at *Shelby, Ohio — Birthplace of the Seamless Steel Tube Industry in America.*

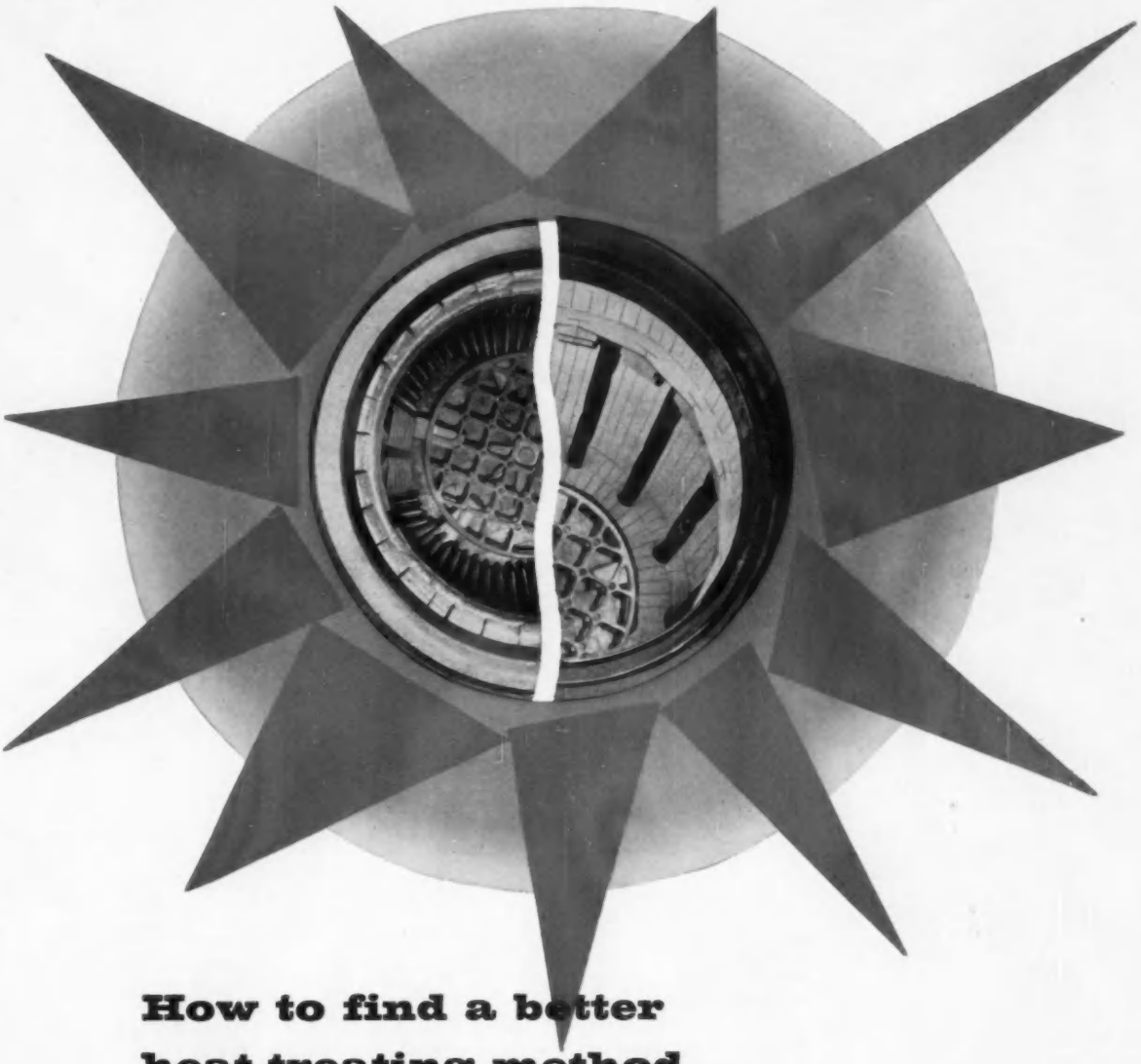
Navy and Army, too. Ohio Special Quality tubing is also used in Sikorsky S-55's adapted for the specialized needs of the Navy, Army and allied nations.

OSTUCO TUBING

OHIO SEAMLESS TUBE DIVISION

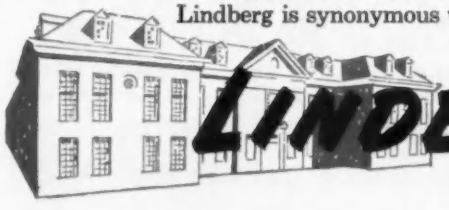
of Copperweld Steel Company • SHELBY, OHIO

Seamless and Electric Resistance Welded Steel Tubing • Fabricating and Forging



How to find a better heat-treating method

Here's a sound way to do it. Take your problems to the people who have consistently, over the years, provided the metal treating industry with new and better ideas, more efficient, more practical equipment. This will bring you to Lindberg, creators of the famous Cyclone type atmosphere furnaces, the long-life "dimple" vertical radiant tube, the revolutionary new CORRTHERM electric heating element and so many other innovations in better heat treating methods. Lindberg is synonymous with heat treating furnaces. We build them for carbonitriding, carburizing, hardening, tempering, normalizing, bright stainless annealing, brazing, carbon correction, nitriding, or any other metal treating requirement. Give your production processes the advantages of Lindberg's forward look in "heat for industry" techniques. Get in touch with your nearest Lindberg Field Representative (See classified phone book) or write Heat Treating Furnace Division, Lindberg Engineering Company, 2491 W. Hubbard St., Chicago 12, Illinois.



LINDBERG heat for industry

Sticks like glue . . . works in

You are looking at a Black & Decker Magnetic Drill Press at work 15 feet off the ground! No operator holds it—it *holds itself* to the work with over a thousand pounds of magnetic power. No operator touches it—he feeds it precisely into the work with fingertip pressure on the exclusive B&D Hydra-Power Feed.

The new B&D Magnetic Drill Presses are truly so unusual they must be seen to be appreciated. They come in two capacities—¾" and 1¼". They are complete precision units—not attachments. They drill, ream and tap upside down, on their sides or upright. They are ideal for tool shops, steel fabricators, heavy machinery, maintenance . . . anywhere you have to take a drill press to the work. THE BLACK & DECKER MFG. Co., Dept. 1406, Towson 4, Maryland. (In Canada: Brockville, Ontario.)

See the Features of the NEW Black & Decker Magnetic Drill Presses

1¼" MAGNETIC DRILL PRESS works high in the air upside down! (Up to 1¼" capacity.)

¾" MAGNETIC DRILL PRESS goes to the work, drills upside down, too! (Up to 13/16" capacity.)

any position!

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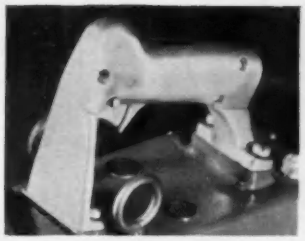
Quality Electric Tools . . . Power-Built for top performance

Look Under "TOOLS-ELECTRIC" in 'Yellow Pages'

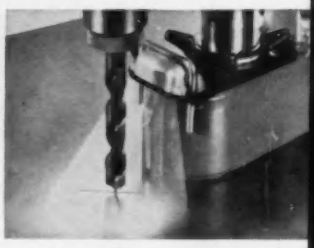
★ MULTIPLE USE! Magnetic Unit of 1¼" Press may be used to hold pieces for butt welding, etc!

★ CLOSEST TOLERANCES! Drill Point Locator provides accuracy never before possible! Built into magnet.

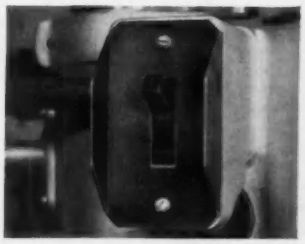
Check these exclusive Black & Decker features!



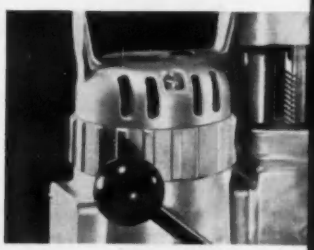
★ SAFETY-GRIP SWITCH keeps magnet always "on" after operator releases switch trigger—another safety plus.



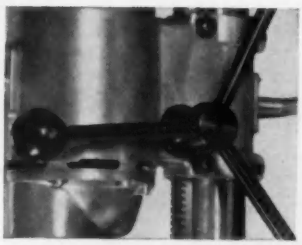
★ WORK AREA BRIGHTLY LIT by exclusive headlight. Special ruggedized bulb withstands hard usage.



★ LONGER LIFE—INCREASED SAFETY results from built-in time delay in 1¼" Reversing Switch. Prevents motor being reversed too rapidly.



★ LONGER LIFE—INCREASED SAFETY as Reversing Switch of ¼" Press is turned. Switch goes to "neutral" then "on" again in other direction.



★ HIGHEST ACCURACY results from unitized construction of drill press—cannot work loose, no side play . . . Drill Press is an integral unit.

★ DRASTICALLY INCREASED SAFETY due to location of magnet near drill point. Provides maximum magnetic power at drill pressure point.

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☐ Please arrange a demonstration of your ☐ 1¼"; ☐ ¾" Magnetic Drill Press

☐ Please send me additional information

Name_____Title_____

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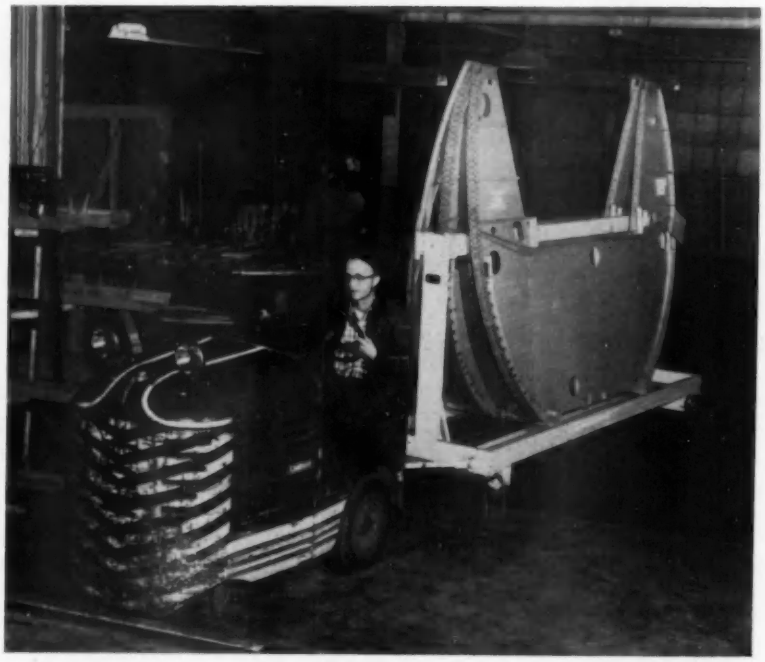
INDUSTRIAL TRUCKS

Play Key Role in Automotive and



Clark truck tows framework of a fuselage section from fabricated sheet metal subassembly section to storage at Oliver Aviation, Battle Creek, Mich.

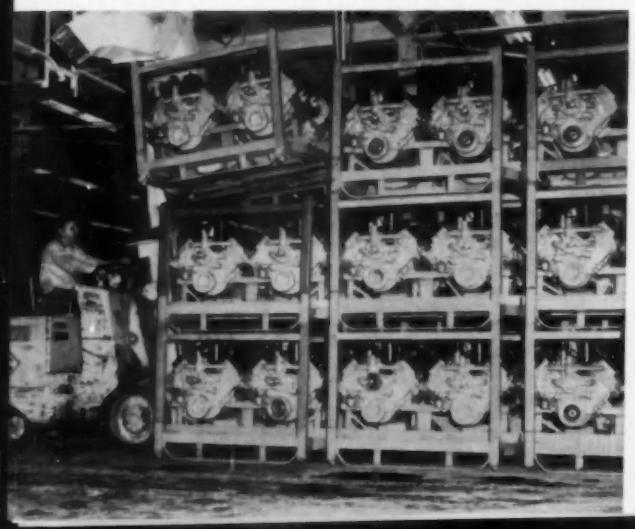
By Andrew W. Shearer

TODAY, as never before, efficient utilization of material handling equipment represents one of the last remaining means for lowering operating costs in both large and small companies. Caught between the twin pincers of high machinery, material and labor costs on the one hand and strong competitive price pressures on the other, many concerns are directing increasing attention to improved material handling.

It has been estimated that in general manufacturing operations the cost of handling material may range from 25 to 90 per cent of total production costs. Thus, the

Engines are tiered in storage, prior to shipment at an automotive plant, by an Elwell-Parker fork truck. Racks permit handling of several bulky engines at a time.

Specially equipped Towmotor lift truck shown in die storage area of automotive parts supplier's plant. It raises load to proper level so that operator can slide dies unassisted from heavy gage steel plate onto shelf of metal storage rack.



Aircraft Plants

Yale & Towne electric truck, equipped with rotating fork attachment and two-way radio, handles automatic transmissions on stacked skids in an automotive plant.

extent to which a material handling program succeeds in increasing productivity and curbing increasing costs may well spell the difference between profit and loss on any given finished product.

The automotive and aircraft industries have been particularly cognizant of the importance of mechanized handling in all of their operations; they number among the largest customers of the $2 billion a year materials handling equipment industry. Many companies and individual plants have appointed highly trained personnel to deal specifically with material handling problems. Unceasing efforts are being devoted to expanding and improving existing programs and developing new techniques so fullest benefits of mechanized material handling may be realized.

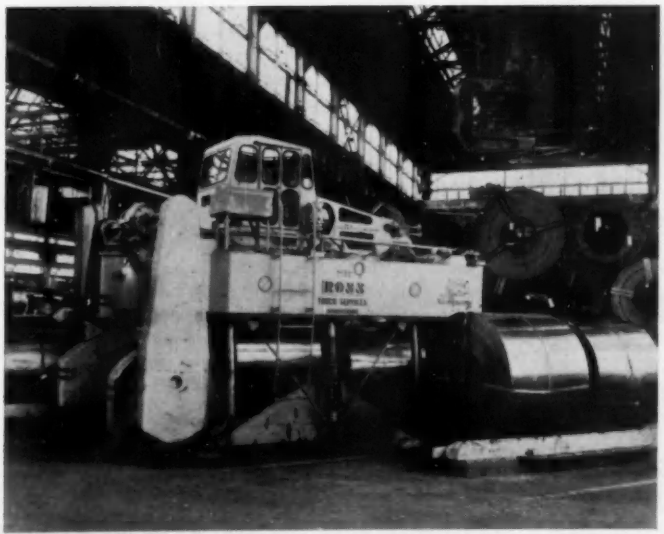
Dominant practice in material handling today is to employ an integrated system: using trucks for unit load handling; employing conveyors for certain other phases; and supplementing them with such other tools of material handling as hand lift trucks, pallets, automatic dispatching, etc. The resultant higher productivity or output of manufacturing areas, machines, and labor stimulates cost reduction and increased profits.

Industrial trucks rank as one of the most widely used of the many kinds of material handling equipment in operation at the present time. Flexible and economical to operate, they range far and wide in loading, transporting, and unloading goods with speed, safety, and a marked ability to work efficiently and closely with other types of material handling equipment. Their versatility is enhanced by a broad variety of attachments to make them multi-purpose material handling tools in every sense of the word. Selected examples of typical industrial trucks at work in automotive and aircraft plants are shown on these pages.

The results of a brief survey taken by AUTOMOTIVE INDUSTRIES to determine the total number of industrial trucks owned and op-

Clark-Ross Series 100 straddle carrier handles rolls of sheet steel inside River Rouge Plant of Ford Motor Co. Coils scheduled for given shops are set in "slots" marked for easy viewing by driver.

A Revolvator low lift platform truck moves partially fabricated springs for automobile seats through congested areas in Cleveland, O., plant of Universal Wire Spring Co. Wheels are dual-drive, 200 deg turning arc. Truck is finger tip controlled.



Yale & Towne gasoline-powered truck with Torque Transmission handles two large crates holding aircraft engines in the storage section of an aircraft plant.

Lewis-Shepard electric truck picks up a load in a confined space in the general stores warehouse of Hughes Aircraft Co., Culver City, Calif. Ability to maneuver in aisles as little as six ft wide is a feature of this truck.

erated by each of the five leading automobile companies as of approximately the end of last year are listed below. The figures gain added significance when it is considered that initial cost per truck may run $6,000-7,000 and up, while operating costs over a period of years may range from $0.35 to $1.05 per hour or more:

1) *General Motors Corp.*—9748 trucks in 126 plants in 71 cities in 19 states in the U. S. (no breakdown by types available).

2) *Ford Motor Co.* — over 3500 trucks, including fork lift, platform and pallet types and two tractors (20 per cent LPG, 25 per cent gasoline, and 55 per cent electric).

3) *Chrysler Corp.*—failed to report.

4) *American Motors Corp.*—259 trucks (199 gasoline and 60 electric).

5) *Studebaker-Packard Corp.* — 168 trucks (127 gasoline and 41 electric).

A great deal has been said and written about the steady advance of automation and its effect on industry. As the use of automated equipment extends into more and more phases of production, the role of material handling equipment in feeding and taking away from such equipment, and the transfer of loads between machine lines, assumes even greater stature. It thus seems inevitable that the mushrooming growth of automation will be accompanied by a similar dynamic rise in the use of material handling equipment.

Industrial trucks in particular appear destined to become more and more key elements in the successful operation of automated plants because they form such natural links between receiving, and/or temporary storage and the starting point of production operations, between banks of machines, and from ends of automatic lines to shipping docks. There is a rapidly growing trend toward designing automatic equipment to feed goods directly into the "hands" of industrial trucks.

• • •

New Linde Co. Oxygen Plant

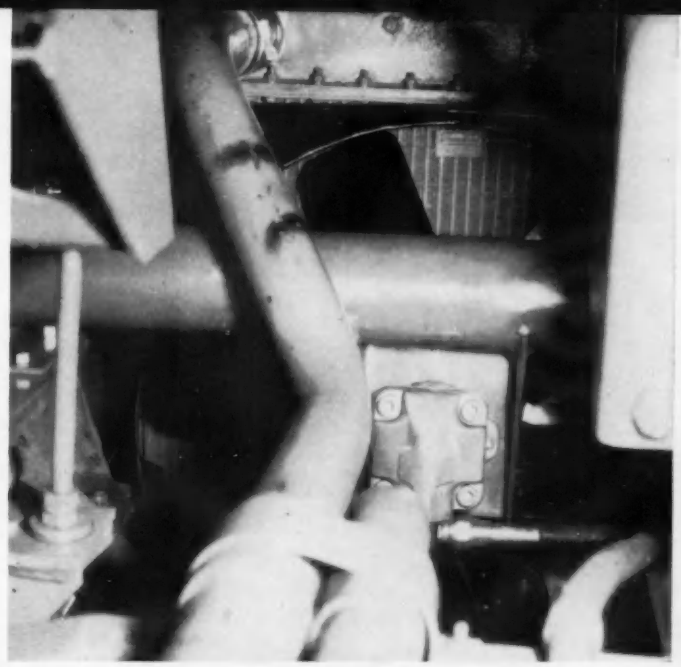
An automatically operated oxygen plant will be built by Linde Co., a division of Union Carbide Corp., at the site of Lukens Steel Co.'s operations at Coatesville, Pa.

Through a unique control system the plant will automatically produce oxygen at the rate required by Lukens Steel's operations, pump oxygen into storage tanks for back-up requirements, and regulate the operation of a host of valves, switches, motors, meters, etc.

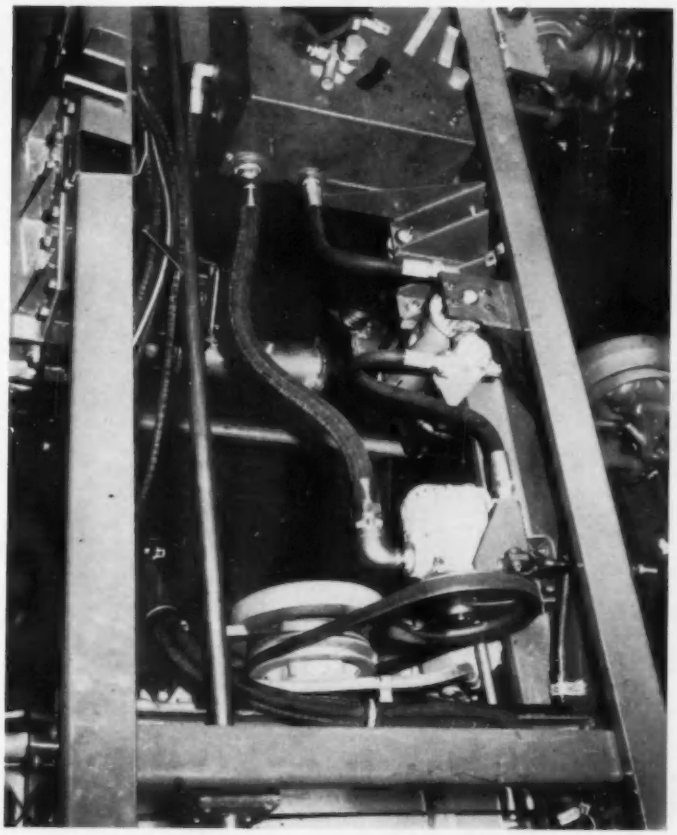
An electronic monitoring system keeps track of all the important components and warns a central office as soon as it detects a possible trouble.

The new plant will be capable of producing 80 million cu ft of high-purity gaseous oxygen a month, and it is scheduled to go on-stream in January, 1959.

Hydraulic Fan *cools* Truck Engine



Denison fluid motor



Denison hydraulic valve and pump

An unique and efficient method for driving engine cooling fans for highway trucks has been developed by Kenworth Motor Truck Corp., Seattle. This new development has been incorporated in a fleet of 20, heavy-duty truck units, recently built by Kenworth Motor for the Pacific Intermountain Express.

Prior to this time, mechanically or electrically driven fan units have been employed for heavy duty operations as required by Pacific Intermountain.

Electrical drives, however, drew heavily on the truck's electrical circuit. Mechanically driven designs wasted power during cold months.

In seeking a practical answer to the engine cooling problems, design engineers at Kenworth decided upon a hydraulically powered system as the more efficient method of driving the main fan unit.

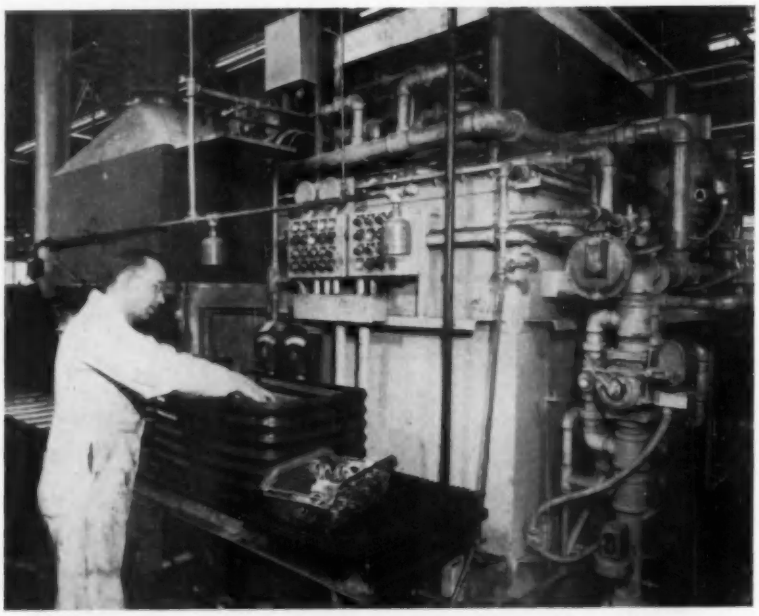
Since engines on the new trucks for Pacific Intermountain Express are located under the cab and behind the cross member, the radiator and fan must be located several feet ahead of the engine.

In the hot summer months, 10 to 15 hp and more were required to perform the engine cooling operation. During winter, on the other hand, the full capacity of the fan was not needed.

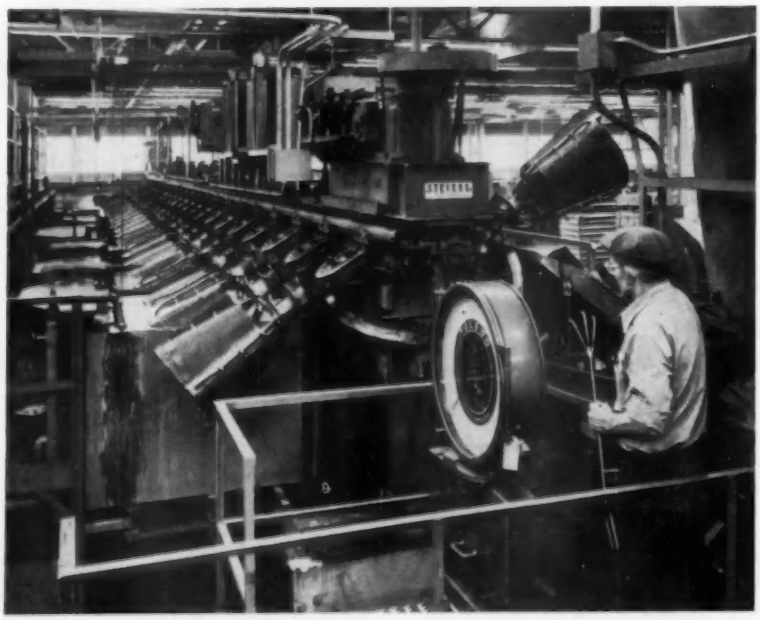
With the present hydraulic system, a Denison TMC balanced-vane pump belt driven from the truck's engine, provides the source of fluid power. The fluid power drives a Denison TMB hydraulic motor. Mounted directly on the shaft of the hydraulic motor, is the fan blade.

The advantage of the new hydraulic system is that the cooling capacity can be closely controlled by regulating the speed of the hydraulic motor. Speed regulation is accomplished by adjusting a Denison RA relief valve. The net result is a matching of the cooling capacity of the fan with the engine requirements.

Ford's Self-Contained Rawsonville Plant



Among the items of equipment in the powder metal department is this Dow heat treating furnace for hardening crankshaft sprockets.



The F. B. Stevens barrel plating machine. It is used for cadmium-plating of all steel parts.

By Joseph Geschelin

Two- and four-barrel carburetors, instrument clusters, heater motors, distributor base assembly and an integrated powder metal operation all are housed in the new Rawsonville (Mich.) plant of Ford Motor Co. Part of the Ford postwar expansion program, this is one of three plants in the Accessory Division.

The Rawsonville plant site consists of about 90 acres and the plant has a total floor space of over 800,000 sq ft including office space. At peak production during 1958, it is estimated that approximately 1400 hourly employees and 360 salaried employees will be on a payroll estimated at more than $8 million annually.

Although the plant is concerned with a variety of unrelated activities, it is completely self-contained for producing the variety of products. For one thing, it contains an integrated department for producing zinc die castings; and another for making aluminum die castings. Each of these is served by its own melting facilities. It is estimated that zinc die casting capacity will consume some 100,000 lb of zinc alloy per month, while the aluminum department is expected to account for some 300,000 lb monthly.

The powder metal department is quite extensive, and is equipped with the most modern facilities known to the art. At the present time the majority of the parts are of iron, a few of copper mixtures. This area has ample room for expansion and specialists have been assigned to study possible applications in Ford cars and trucks as well as products made by other di-

Large Facility Contains Departments for Making Zinc Die Castings, Aluminum Die Castings, and Powder Metal Parts

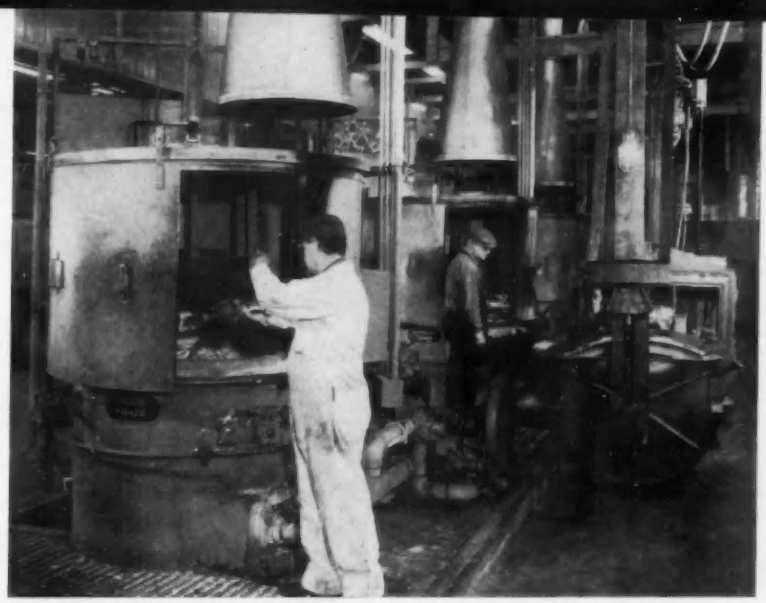
visions. This operation was transferred from the Dearborn area early last year.

In addition to the prime facilities mentioned above, the plant also has automated equipment for chemical treatment and electroplating. For example, all aluminum parts are given the familiar Alodine chemical treatment for corrosion resistance, all parts being processed through a large plating unit. Zinc die castings are given a dichromate treatment for the same reason in another plating machine. In this case, the parts are handled in baskets. Finally, all steel parts are cadmium-plated in an automatic barrel plating machine.

Because of the enormous variety of detail operations involved in the making of the various products, this article is intended solely as a sampling of activities. Later on we shall devote another article to a sampling of the procedures involved in the manufacture and testing of carburetors; and the steps in making the small heater motors.

Let us turn our attention briefly to the die casting facilities. The zinc die casting department is served by a battery of three electric melting furnaces. Molten metal is delivered by an operator-manned carrier directly to each of the die casting machines.

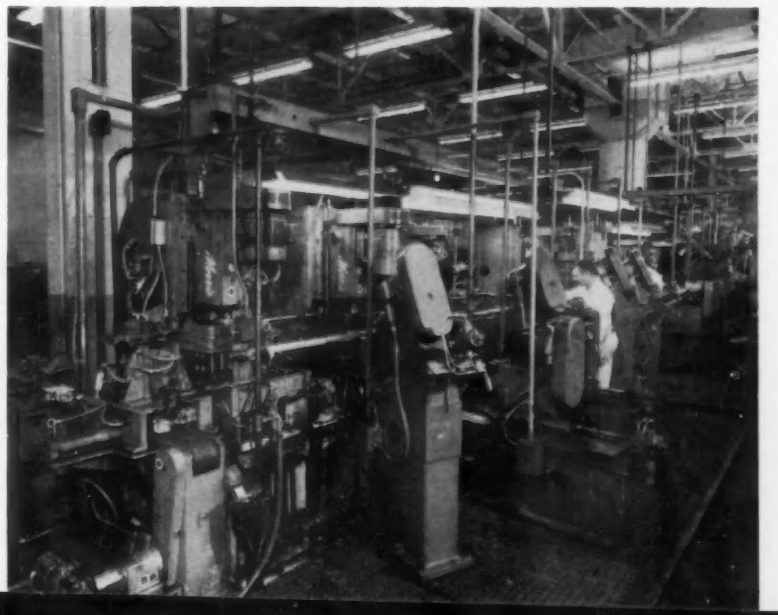
The aluminum die casting department, in turn, is served by a battery of melting furnaces, the molten charge being delivered by carrier to holding furnaces at each die casting machine. The entire aluminum area is equipped with die casting machines ranging in capacity from 600- to 850-ton. Among other things, it produces carburetor bodies and other carburetor com-



A group of Lindberg electric melting furnaces in the zinc die casting department.

General view in the zinc die casting department. These are the new Lake Erie diecasting machines installed in this area.

Perspective view of a portion of the Morris transfer machine line on the four-barrel carburetor body.



RIGHT—

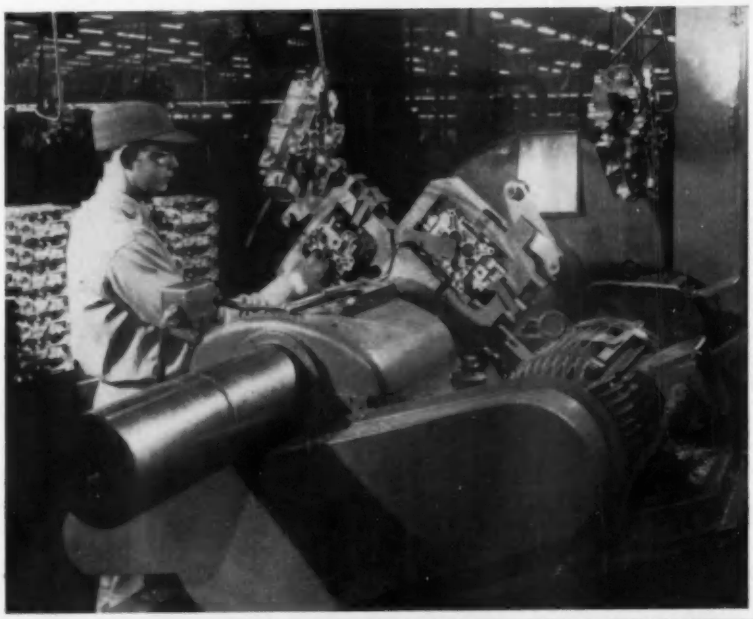
Typical of a number of Avey multiple-head drilling machines is this one for drilling fine holes in the carburetor booster support.

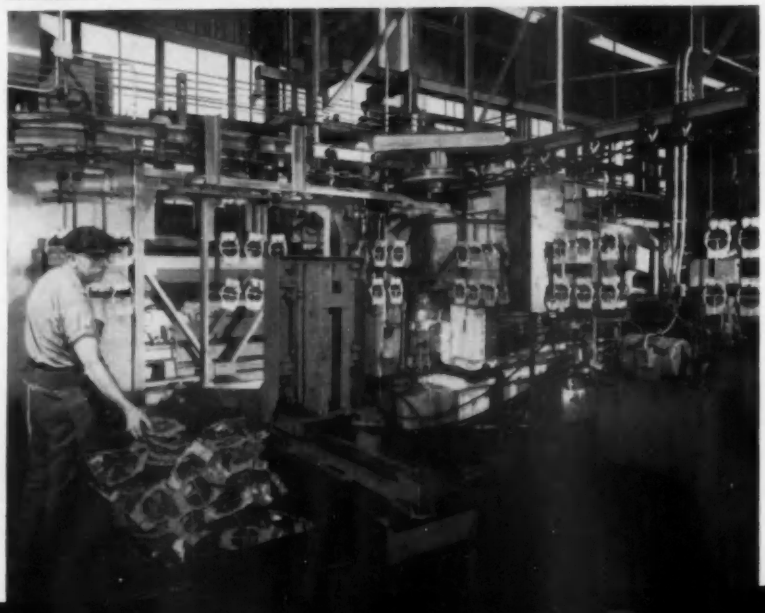
BELOW—

Straddle-milling of both faces of four-barrel carburetor bodies in a Roto-Matic machine is seen in this view.

BOTTOM—

Large Wagner Bros. Alodine chemical coating machine. All aluminum parts are put through this unit for processing.





ponents, as well as the large distributor base casting.

Doubtless the most extensive area is the one devoted to the manufacture of carburetors for Ford engines. The assembly is exceedingly complex because of the many fine tolerances involved in machining and calibration; made even more complicated by the variety of holes, including many extremely small diameter holes. The carburetor body, for example, has an extensive transfer machine line of multiple-head units, as well as a group of dial type multiple-head machines. In many respects the tooling is similar to that of a cylinder block except that everything is on a smaller scale.

Before carburetor bodies enter the transfer machine the top and bottom faces are straddle-milled in a vertical machine with a dial type indexing table.

As mentioned earlier, all aluminum parts, after washing, are put through the plating unit to receive the protective Alodine coating. Then they are delivered to the assembly department. Here they have individual stations on which are made up the various sub-assemblies, later fed to the final assembly conveyor.

The final assembly conveyor is provided with two rows of vises, one row for two-barrel carburetors,

LEFT—

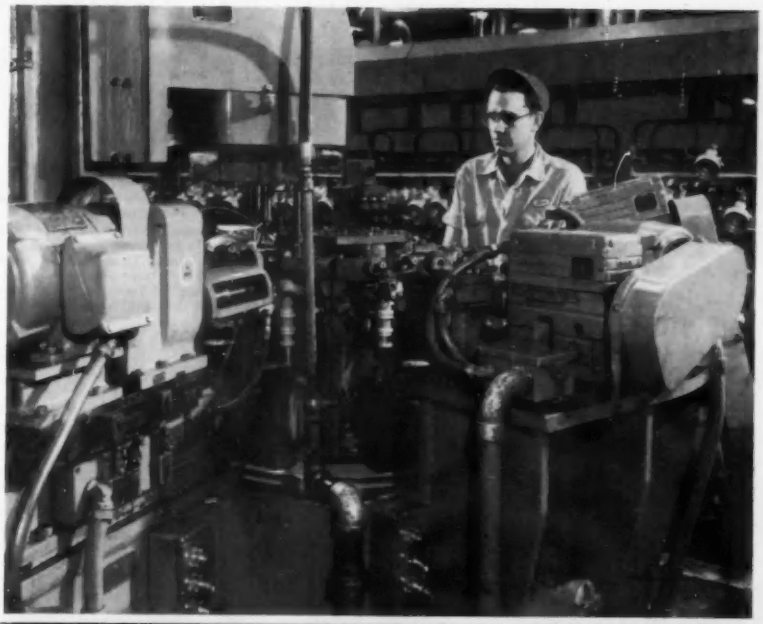
Interior of one of the Mecha deburring machines for rotor parts in the powder metal department.

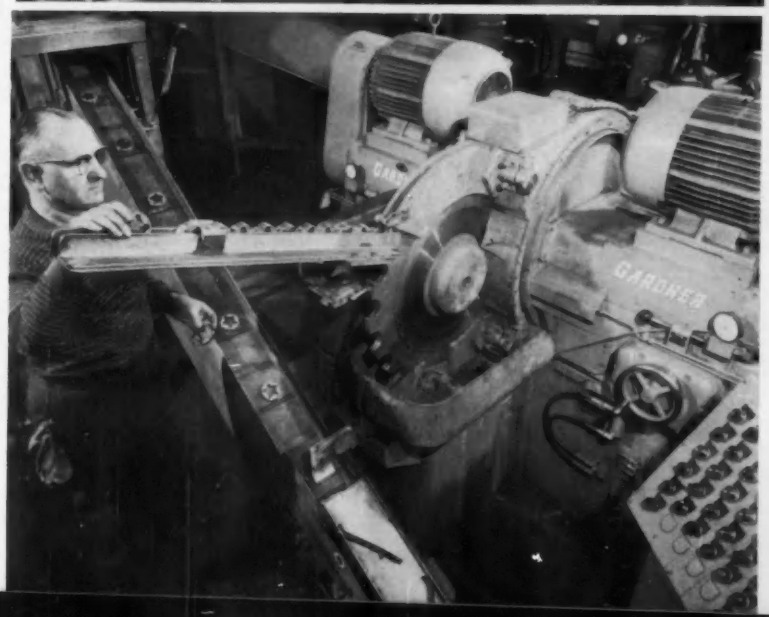
BELOW—

One of the Buhr vertical drilling machines on the distributor base. As seen here the machine incorporates both vertical and horizontal heads.

BOTTOM—

Both sides of rotor pump components are ground in a single setting in this Gardner double-end grinder. The machine is arranged for automatic loading and unloading. Parts are fed to the machine via the manually-loaded chute and are ejected automatically onto the elevator mechanism in the foreground.





the other for four-barrel carburetors. A unique feature of the vise lies in the ability of locking it in any position for the convenience of the operator.

Completed carburetors then are transported by monorail conveyor to the flow room where each one is put through a standard test schedule, including idle adjustment.

Proper control of carburetor characteristics is so vital to engine performance and fuel economy that many special precautions are taken to assure uniformity of calibration. Although carburetors go through the routine flow test 100 per cent, a sampling of carburetors is made before they leave the flow room, a certain number of units being retested hourly. In addition, while carburetors are being packed for shipment, random samples are taken from the cartons and subjected to still another check.

Besides this, a number of carburetors are selected each day for a complete test schedule in the master flow room. All of these controls are necessary to patrol the work of the operators as well as to correlate the test equipment itself.

Typical of the detail involved in carburetor manufacture is the drilling and machining of the booster support, a slender aluminum part. It takes a large number of very fine drilled holes, completed in a

number of stages in multiple-head indexing drilling machines.

The distributor housing is an aluminum die casting machined completely and finished as a sub-assembly. Preliminary roughing operations are done in chucking machines, then precision boring is handled in three-station, double-end boring machines. Drilling of a variety of holes is done in vertical indexing drilling machines.

The distributor shaft is processed on an automated line, starting with plunge grinding of the OD in a centerless grinder. The work is fed automatically to an induction hardening machine and upon completion of heating and quenching the parts return to the conveyor for two additional passes through centerless grinders, for finish grinding.

Although the heater motor is a small package, it involves an enormous amount of special processing, including automatic winding machines, automatic assembly machines, and special test devices. It deserves special attention and will get it later on. At this time we shall touch on only a few of the steps in the process.

An interesting example of engineering economy is the press for producing laminations. The motor requires two kinds of laminations—small ones for the armature; and larger ones for the yoke. Both are punched from a single strip in a progressive die, thus reducing scrap to the very minimum. As illustrated, the armature laminations, made in the first section of the die, are ejected from the front of the machine, feeding directly to a special armature core assembly machine. Yoke laminations come out in chutes on the side of the press and are collected in tubular containers.

The armature core assembly machine is representative of the intricacy of detail required for producing the motor. Here is the sequence of operations:

Station 1 inserts drive-end spacer bushing into nest in holding fixture.

Station 2 blanks end fibre lamination and locates on holding fixture. (Drive end.)

Station 3 selects core stack, shuttles into location over holding fixture and transfers into position on holding fixture.

Station 4 blanks end fibre lamination and locates on holding fixture. (Brush end.)

Station 5 compresses lamination core and auto. inserts shaft to specified dimension.

Station 6 places brush end spacer over shaft against end fibre lamination.

Station 7 strips finished core assembly from holding fixture and automatically ejects to feed track.

As mentioned earlier, one of the major departments is the one handling powder metals. Weighing and mixing of powders is done on a mezzanine at one end of the bay. The prepared mixture then is fed through tubes directly to each of the hydraulic briquetting presses on the floor. At the present time they handle parts only in iron and bronze or brass.

Sintering of parts is done in a battery of controlled atmosphere electric furnaces. Due to the variety of parts processed here, some of the furnaces have mesh belt conveyors, others are of continuous roller hearth design. Parts are handled in Inconel trays. Both exothermic and endothermic atmospheres are available, depending upon the nature of the sintering cycle.

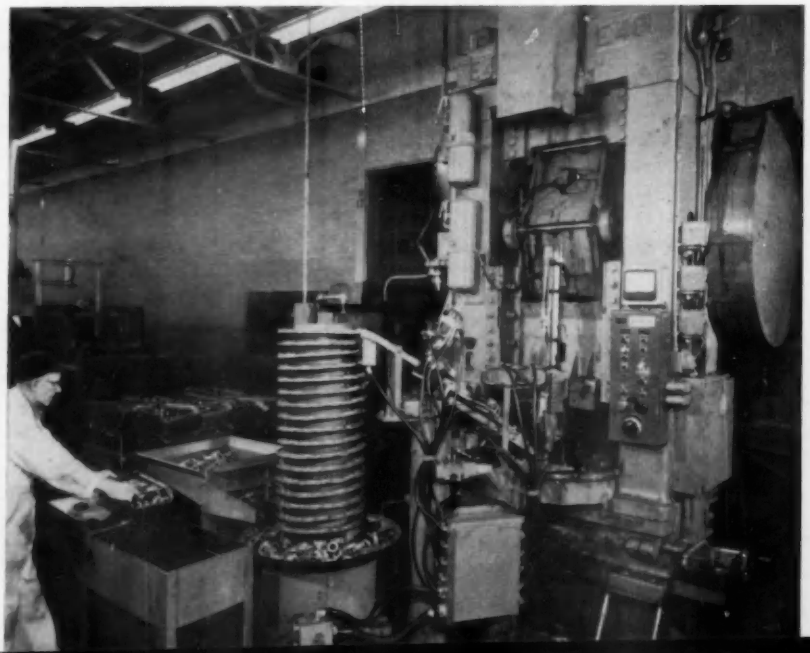
Many of the parts, particularly such parts as inner and outer sections of rotor pumps, must be held to close tolerances on thickness. To meet such requirements parts are put through sizing presses after sintering, coining them to the required dimensions.

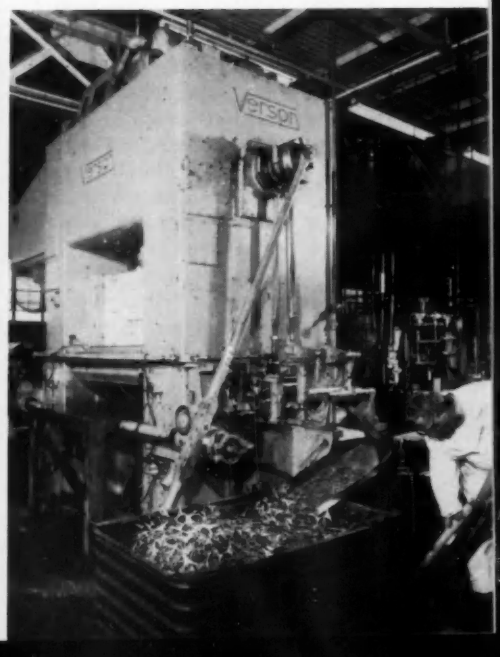
In certain cases parts require

(*Turn to page* 106, *please*)

AT LEFT—Ferracute sizing press in the powder metal department. In the foreground is the unique Syntron hopper which moves parts from the bottom up. Connecting the hopper with the press bed is the special automation for feeding gears to the die and, at the same time, locating gears in proper alignment.

AT RIGHT—The two types of heater motor laminations are produced in a single setting in this Verson press. It will be seen that scrap comes out to the left, while yoke laminations are ejected at the side into the long tubular holders being handled by the operator. Armature laminations, on the other hand, are ejected to the rear and are delivered by conveyor to the assembly machine.





Report from the

FARM EQUIPMENT INDUSTRY

By Kenneth Rose

John Deere's new crop dryer

WITH figures for the first six months of 1958 taking shape, it is becoming apparent that farm equipment sales for the half year will about equal, or slightly exceed, those of the same period a year ago.

The figures are not as conclusive as would be the case in a normal year, because implement manufacturers get their first indication of sales levels from early sales in the southeastern part of the country. This year that region has been set back by bad weather, and the sales pattern is late in developing. Sales in the Southwest, the northern mountain states, and in the Midwest are reported as good, however.

An unusual feature of the sales of farm equipment is the fact that implements are going well, but tractor sales are lagging. Many possible reasons have been suggested for this—the fact that one tractor can be used with many implements; that farmers, expanding their stock of machinery to work a bigger farm, will buy additional implements before they will go to a second tractor; and seemingly very important, price. Many farmers feel that prices of the new tractors, with many improvements, are high; and they either postpone purchase, or buy a used tractor. Used tractor sales are doing so well that International Harvester reports that in some cases its tractors of seven or eight years ago are selling in the used equipment market for the original price.

Some interesting figures for March, compiled by the Federal Reserve Bank of Chicago for the Midwest, indicate how complex the situation is. The figures given are the per cent change from those of March, 1957:

Farmers' demand deposits	+0.6%
Farmers' time deposits	+8.8%
Dealers' sales of farm machinery	—3.5%
Dealers' sales of automobiles to farmers	—18.2%

So it seems that the farmer has more money than at the same time a year ago, but just refuses to spend it as rapidly as heretofore.

Oliver combine with corn header

Corn Header

Oliver Corp. recently announced a two-row corn header for use with its self-propelled combines, which takes the entire cornstalk through the machine without the use of snapping rolls. It cuts off the cornstalk and carries the whole stalk into an enclosed threshing and shelling cylinder. As the kernels are undisturbed until they reach the shelling chamber, there is no loss of the grain before it reaches

(*Turn to page* 101, *please*)

Russia Exhibits New Tractor Models at Brussels World Fair

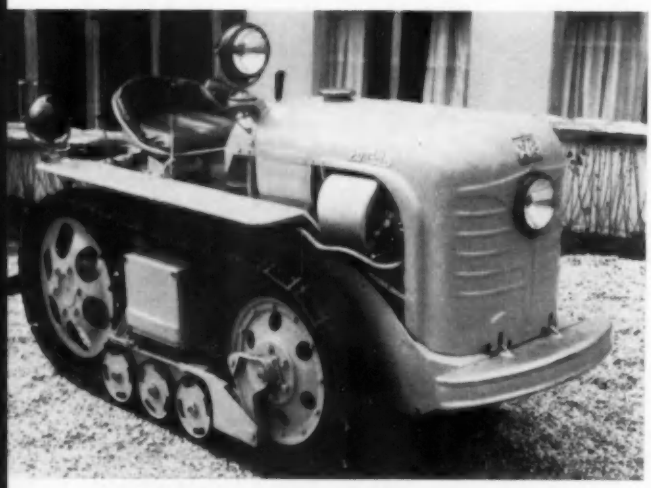
By
David Scott

BRUSSELS, BELGIUM

Now on show here at the Brussels World Fair is a sizeable display of the latest Russian tractors and earth-moving vehicles, in addition several cars and trucks that have already been described in AUTOMOTIVE INDUSTRIES. Many of the machines have never been publicly shown before, even at the Moscow Agricultural Exhibition or at the Leipzig Fair. One of these is the small DT-16 crawler, made in Kharkov, which is intended for orchard and vineyard work. Power unit is a 104-cu in. aircooled Diesel developing 16 hp at 1600 rpm and driving through a six-speed transmission. A feature of this tractor is the variable wheelbase for positive track tensioning. Each front wheel is carried on an offset stub axle whose radical positioning is determined by the movement of the triple-roller suspension unit.

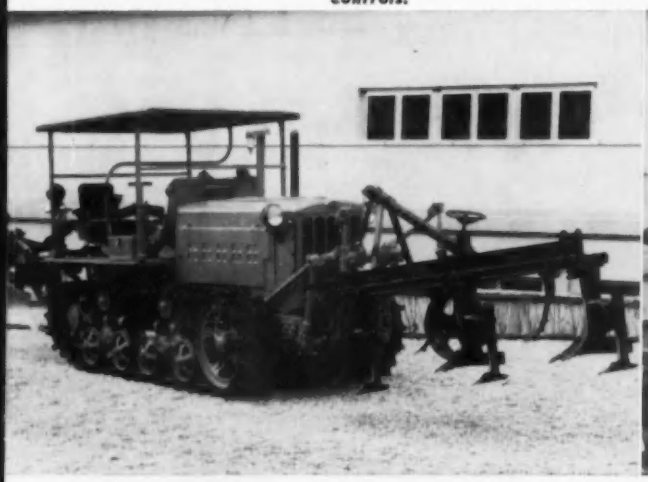
The roller beam, pivoted at the rear, has its forward end linked to a three-point rocker arm attached to the wheel spindle and a heavy spring. Surface irregularities raising the suspension unit cause the rocker arm to pivot against the spring, thereby moving the wheel rearwards and slackening the track to permit flexing of the suspension.

The DT-57 crawler is a two-way machine, designed for cultivating mountainous or steeply-graded areas where it would be difficult to circle or to turn the tractor around. It has fore- and aft-mounted implements with individual hydraulic linkage so that work can be carried out in both directions, and two opposed driver's seats facing the central controls. Instruments

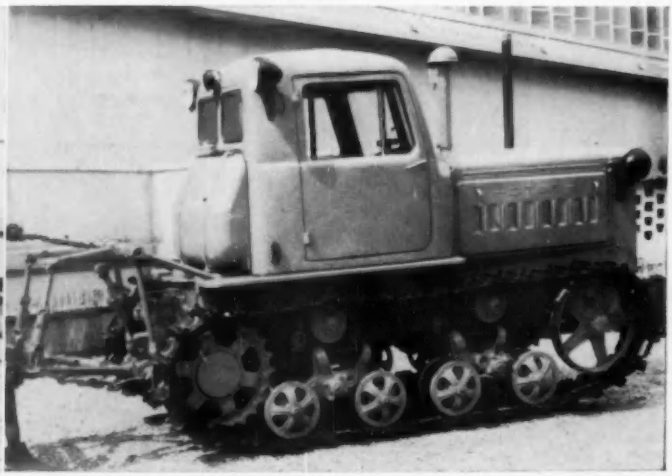


Small Diesel crawler, the DT-16, for orchard work features variable wheelbase to maintain track tensioning.

Two-way 75-hp crawler, the DT-57, has implements carried on both ends and two driver's seats facing the central controls.



Equipped with heated cab, 55-hp DT-56 is designed for cold-weather operation.



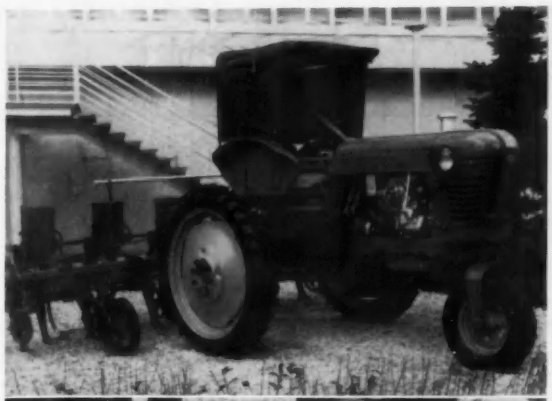
Also on Display for First Time Are Three Road Construction Machines

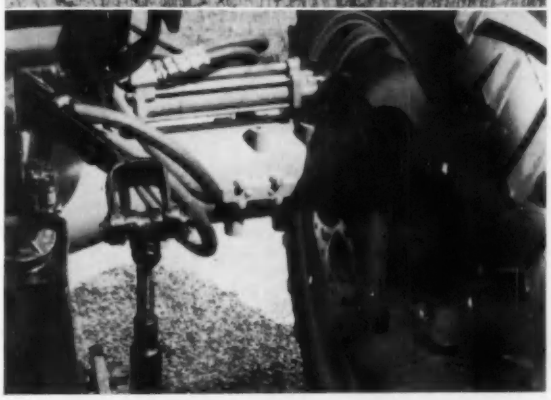
include an inclinometer, and maximum permissible tilt is 35 deg in any direction. Engine is a 480-cu in. Diesel rated at 75 hp at 1500 rpm. Production of this model at the Stalingrad factory is expected to reach 1000 units this year.

A smaller tracklayer shown at Brussels is the DT-56 with a 330-cu in. Diesel developing 55 hp at 1500. Intended for coldweather operation, it has a heated cab fed with warm air ducted from behind the shrouded engine radiator.

Power-operated track width is a refinement on the DT-28-3 tricycle tractor. Individual hydraulic rams on the rear axle housing displace the drive wheels to vary the tread from 49 to 65 in. Double-reduction gearing is incorporated in each wheel hub to give a ground clearance of 26 in. Because of this construction, there is also a splined collar surrounding each half-shaft. The 28-hp two cylinder Diesel engine has a variable compression ratio, and is equipped with spark plugs and carburetor for starting on gasoline.

Four-wheel drive is featured on the MTZ-7, another new machine. It has a 45-hp four-cylinder Diesel engine driving through a transmission combining gearbox and transfer case that give ten forward and two reverse speeds. Other design points are splined half-shafts to permit varying the track width, and an accelerator pedal linked to the hand throttle. The frame is drilled to carry mid-mounted implements, and additional hydraulic pipes are available for their operation. Smallest wheeled tractor displayed at Brussels is the DT-20 from Kharkov, with a single-





DT-28-3 for row-crop work (top photo), has hydraulically adjusted tread, using individual rams to space the drive wheels on their splined axles, as shown in bottom photo. Reduction gearing in each hub raises the axle height for a ground clearance of 26 in. The 28-hp Diesel engine starts on gasoline.

Russia's first four-wheel drive tractor is the MTZ-7 with a 45-hp four cylinder Diesel engine.

Lightweight DT-20 is powered by a single-cylinder Diesel engine developing 20 hp at 1800 rpm.

D-357G 11.8-cu yd scraper has a two-wheeled tractor powered by a 165-hp Diesel.

D-395 Diesel grader features all-wheel drive, variable tire pressure, and a 16-speed transmission.

Diesel-electric scraper, the D-369, has a two-wheeled tractor with a 280-hp V-12 engine driving the generator. Each of the four wheels is powered by an individual electric motor. This 50-ton unit was viewed and photographed while parked behind the Soviet hall, and before it was fully assembled and officially on display.

cylinder Diesel putting out 20 hp at rate of 1800 rpm.

The Soviets' exhibition of construction equipment at Brussels included the unusual D-369 motor scraper with a two-wheeled Diesel-electric tractor. A 280-hp V-12 engine drives the generator powering the individual motors on the forward and trailing wheels. Twin cooling radiators are housed in the 11.6-ft-wide prime mover. No mechanical transmission is used, and speeds variable from 1.2 to 17 mph are electrically regulated.

The various implements carried on the central beam are controlled both hydraulically and by electrically-driven winches from the operator's cab at the rear. Steering of the rigid-axled tractor is hydraulic. The unit weighs 50 tons, and is said to have an earth-moving capacity of 1050 cu yds per hour. Details of operation were not available at the time of this visit during the first days of the World Fair, and the machine was not fully assembled nor even officially on view.

Of more conventional design is the D-357G scraper of 11.8-cu yd capacity, again with a two-wheeled tractor but powered by a 165-hp Diesel through a mechanical transmission giving four forward and one reverse speeds. Steering and scraper control are hydraulically operated. Empty weight of the combination is 17 tons.

Also displayed by Russia is a 150-hp Diesel grader with drive to all six wheels, each incorporating reduction gearing that raises the axle heights. Designated D-395, it has an 8-speed gearbox with 2-speed transfer case providing a total of 16 ratios for a forward range of 0.22 to 17 mph.

Tire inflation can be simultaneously varied while the machine is in motion: air is released to increase traction on soft ground, while pressure is raised to harden the tires for driving on packed surfaces or roads. A built-in compressor supplies air to each tire through the individual axles and rotary couplings. Steering, brakes, and the large scarifier on the nose are hydraulically operated. The machine has a 12-ft blade, an air-cooled, heated cab, and weighs 15.6 tons.

Russian Automatic Transmission

AN automatic transmission which is claimed to be of Russian design is a feature of the Soviet-built Volga passenger car.

The Russian automatic drive combines a hydrodynamic torque converter, a planetary gear transmission and a hydraulic control system. Operated by steering column lever and accelerator pedal, the unit has three forward speeds and reverse. The hand lever controls reverse and low as in some of the earlier automatic drives made in the U. S. The shift from second to third is pedal-actuated from a standing start. Depending on pedal position when accelerating, the shift occurs in the range between 11 and 47 mph. The shift back to second is possible at any speed below 43 mph.

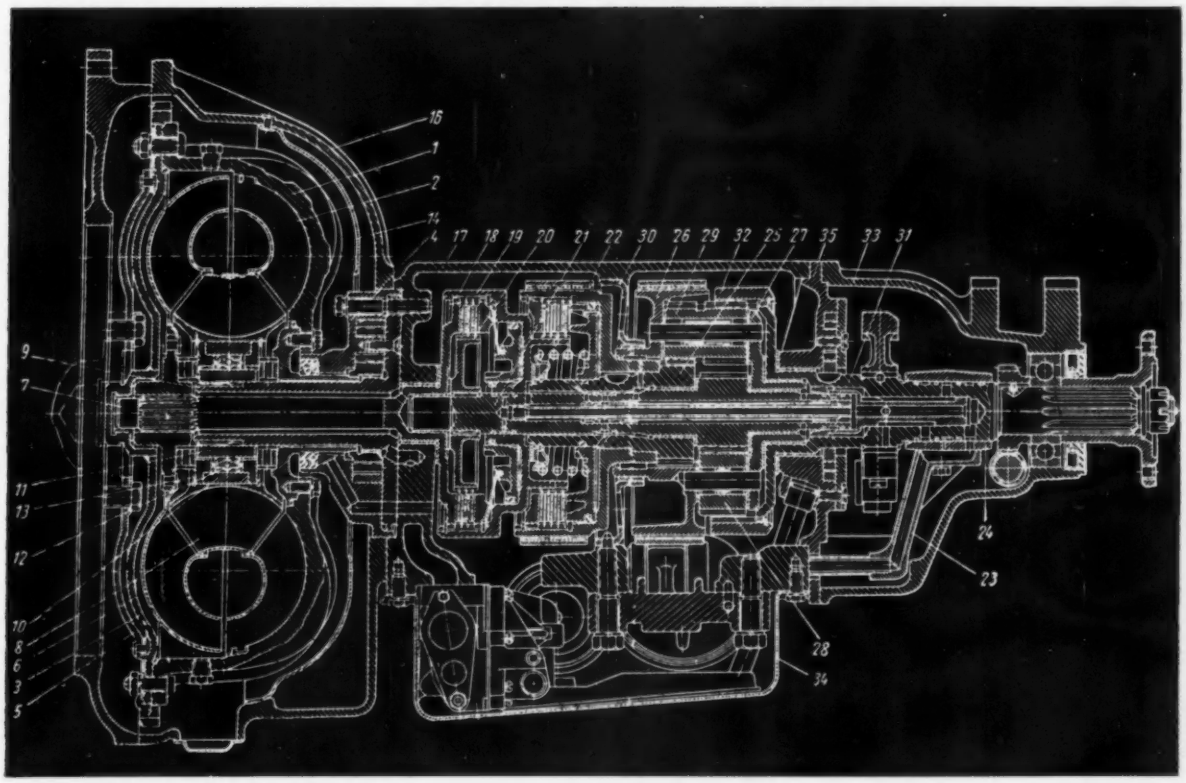
Precision cast aluminum formed under pressure and in permanent molds is widely used in making the transmission elements. Other fabrication features are assembly of stamped parts without soldering or welding, new friction material for clutch disks and brake bands, and bimetallic bearings.

The transmission's working parts are shown in the illustration which is a drawing of the torque converter, left, and the planet gearing with clutches, brakes and hydraulic control system, right.

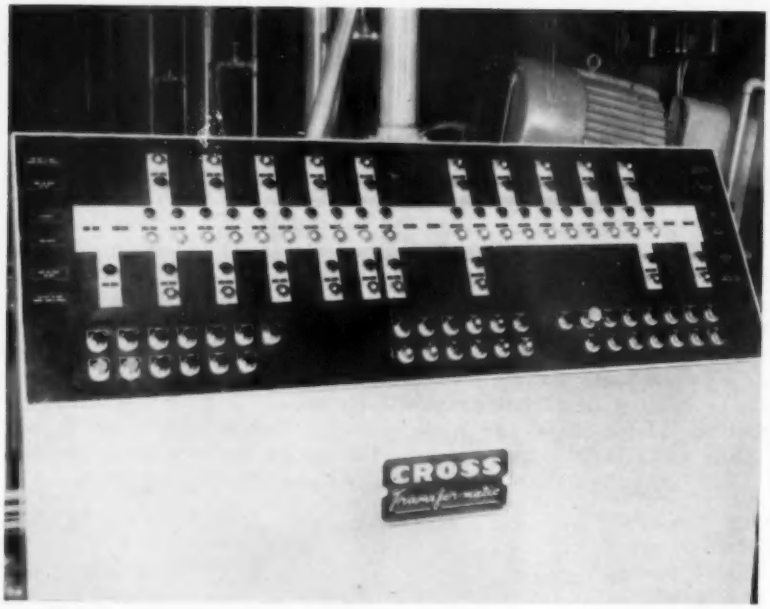
The single-stage torque converter has the usual three elements: converter pump, turbine, and reactor. These elements are shown in cross section under the respective numbers 2, 6 and 8. The pump has 31 stamped vanes of constant thickness; the turbine has 33 similar vanes; the aluminum alloy reactor has 11 vanes profiled in thickness. The turbine's grooved hub is set on driving shaft 7 of the planet gearing. The reactor is connected with the fixed reaction shaft 9 through an overrunning clutch.

The torque converter is air cooled by fins cast in its housing and operating as fan vanes.

Longitudinal sectional view of the automatic transmission

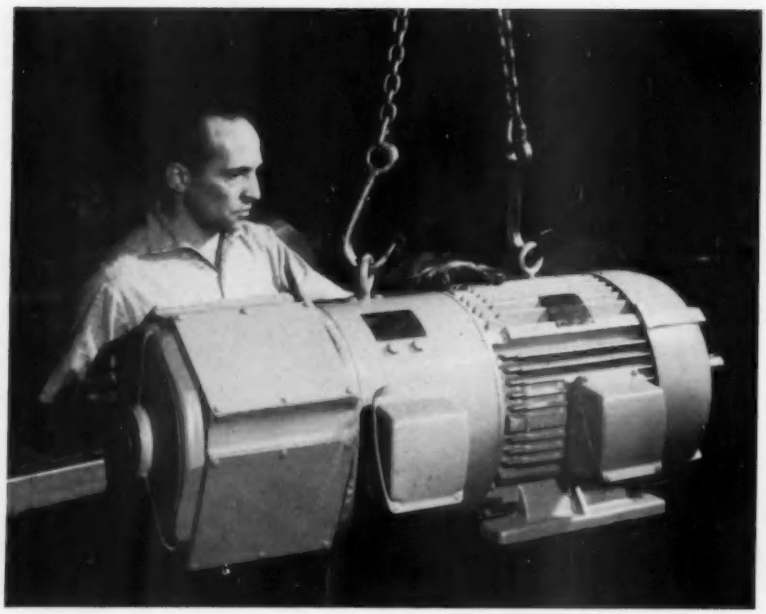


Latest Control Systems and Devices



The layout of this Cross Co. console simulates a plan view of the machine which it controls for ease of visualization and trouble-shooting

Rectiflow a-c adjustable-speed drive combines a wound-rotor induction motor with a d-c motor, built on one output shaft



By Charles A. Weinert

NEW machine tool control devices and positioning systems were among the many timely subject matters discussed at this year's Westinghouse-sponsored 22nd Machine Tool Forum. Machine tool drives, servo system applications, machinability, and "space age" materials were other top items on the excellent program.

Having as its theme "Engineering for Tomorrow . . . in the Machine Tool Industry," the forum was held on April 29-30 at Buffalo, N. Y. In attendance at the two-day meeting were some 450 engineering and production executives, including representations of major automobile manufacturers and machine tool builders.

There were 20 presentations by machine tool company engineers, Westinghouse Electric Corp. engineers, and other technical specialists. It was noted that audience participation was particularly in evidence—not only following out the concept of the conference, but also indicative of the interest displayed in the topics under discussion.

Alfred V. Bodine and Ludlow King, president and executive vice-president, respectively, of the National Machine Tool Builders' Association, were two of the guest speakers. Both gave inspiring talks which received very favorable after-comment. Mr. Bodine stressed the value of communications—particularly public relations—in the progress of all industry and in the advancement of our economy. The importance of the American machine tool industry in its relation-

Highlighted at Machine Tool Forum

ship to national security was impressively stated by Mr. King.

A-C Adjustable-Speed Drive

A new concept in packaged a-c adjustable-speed drive, called Rectiflow, was described by W. R. Harding, Westinghouse Electric Corp.

The drive unit consists of a wound-rotor induction motor and a d-c motor built on a common shaft. Associated equipment in the package includes a set of semiconductor rectifiers that converts the a-c slip power of the wound-rotor motor to d-c. This d-c power is fed to the armature of the d-c motor and hence converts the slip power to mechanical output. Rectifiers are also supplied to convert a-c from the incoming power line to d-c for the d-c motor shunt field. A rheostat in the separately-excited d-c field circuit makes it possible to control speed by adjusting the field strength of the d-c motor. Ability to control the speed of the drive by adjusting the field current of the d-c motor also permits the use of magnetic amplifiers and electronic control devices.

Rectiflow drives have been developed in 1½ to 1, 2 to 1, and 3 to 1 speed ranges, for both constant-horsepower and constant-torque applications. Those rated from 7½ to 75 hp are built as a unit frame, as will be the drives in smaller ratings now being developed. Above 75 hp, separate components will be coupled on a common bedplate.

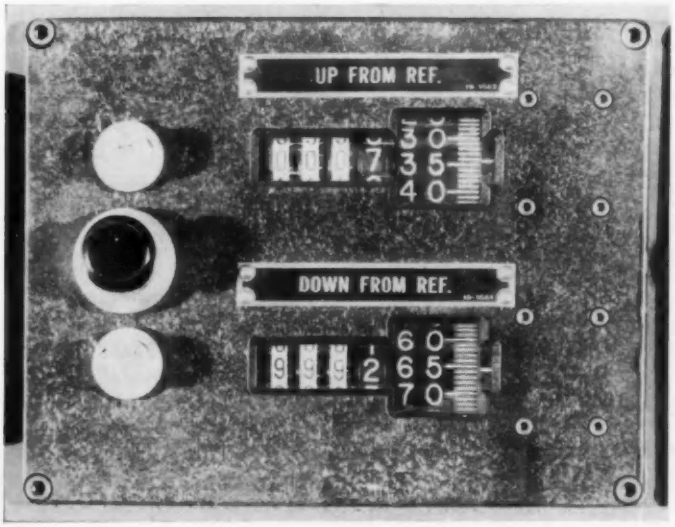
Console Design for Trouble-Shooting

As Frank G. Boledovich, The Cross Co., pointed out at the meeting, a well-designed pushbutton control console is of considerable value to the maintenance man who is trouble-shooting a transfer-type machine. In the opinion of the speaker, the design of the console, including the arrangement of pilot lights, deserves as much consideration as the design of the related circuitry.

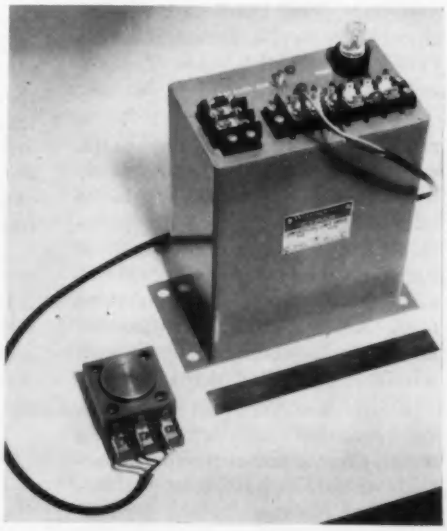
He went on to explain that to achieve simplicity of design and operation, the only unit information which should be signalled by pilot lights at the main console is that which reflects a point of interlocking between the basic machine and the unit. These signals usually answer the following questions: (1) Is the unit in its normal position? (2) Has the unit completed a cycle since the last transfer? (3) Is the unit set for automatic cycling, or is it being used for manual operation? (4) Has a fault been detected at the unit?

The design and functioning of two typical consoles were described. In one of these the layout simulates a plan view of the machine itself. Pilot lights are arranged on the outline of the machine in the same relative positions as the devices they represent. This console arrangement therefore gives a direct means of determining the location of a particular clamp or unit failure. In addition, the pilot lights are grouped in easily-read patterns so that in case of trouble a break

Closeup of a Giddings & Lewis position readout unit. Four of these were applied to a horizontal boring machine to register motions of headstock, column, spindle, and underarm.



This static proximity limit switch, recently developed by Westinghouse, is compatible with existing control systems



in the normal pattern is quickly discernible.

Static Control Devices

Newly-developed small packaged static control units of several types, including a static proximity limit switch, were described by A. M. Magagna, Westinghouse Electric Corp. All feature increased reliability, and compatibility with existing control systems.

Usable for sensing part or machine position, the two-element proximity limit switch delivers a d-c output when a piece of ferrous material is brought near its sensing head. The sensing head is a molded unit containing half of an inductance bridge; while the other portion of the induction bridge, power supply, transistor amplifiers, phase detectors, and flip-flop are encapsulated in a steel box. The device has an adjustable operating distance of ⅛-in. minimum to ½-in. max., and will operate up to 20 times per sec.

Another new product is the Cypak dual safety interlock, a static magnetic control device for machines such as punch presses that requires both palm-buttons to be pressed simultaneously to initiate each machine cycle. It provides full-safe operation by eliminating sources of circumvention. De-energization occurs upon the release of either control switch; but re-energization will not occur upon re-closing the opened switch. It is necessary to release both switches, and then press them at the same time. The device is suitable for driving a Westinghouse Type Z control relay with six-volt d-c coil.

Still under development is a series of static time delay units, combining magnetic components with transistors, which are to be offered as replacements for pneumatic timing relays and vacuum tube timers. The time delay will be variable from 0.1 sec to 1.5 minutes. Reset will be instantaneous, and the units can be designed with a built-in memory feature.

A completely transistorized preset counter, for initiating an action after a preset number of actions or objects have been counted, is one of the most recent developments. It features a modularized decade which enables the range of the counter to be easily extended. Input count signal can be provided by either a mechanically-actuated switch or photoelectric means. When utilizing cadmium selenide cells as the photoelectric device, a counting rate of 200 per sec is possible. For higher counting rates, to 10,000 per sec, a phototransistor can be used.

Also in prospect is a reversible counter which will add and subtract. A device of this kind, which can be electrically preset by IBM card, punched tape or magnetic tape, was stated to be currently under development.

It was further indicated that present devices will be supplemented with companion models for wider fields of application. In the limit switch series, for instance, new models will provide multiple-head sensing, sensing of non-ferrous materials, increased range, and other features.

Position Readout System

The makeup of a position readout system that gives a direct numerical reading at the operator's station of the position of the cutting tool relative to the workpiece, was described by Arthur O. Fitzner, Giddings & Lewis Machine Tool Co. It permits the operator to read dimensions on both sides of a reference zero. The reference zero can be set initially at any desired location. No interpretation of the readings is necessary—they are shown directly and to the thousandth of an inch.

The basic system for indicating each machine movement comprises three components—the numerical indicating readout unit, an input synchro, and a servoamplifier. When the machine moves, it rotates the shaft on the input synchro and the counters follow.

In the first application of the system to a large horizontal boring machine, four motions are registered at the control station—headstock up and down, column backward and forward, spindle in and out, and underarm in and out.

Electro-Mechanical Control

For automatically positioning the slide of a tracer lathe, a control system has been devised which combines electronics and mechanics. This system was outlined in a paper presented by Robert E. Eisengrein, Seneca Falls Machine Co.

It utilizes a two-phase servomotor which is mechanically-amplified. The mechanical amplifier uses a novel "windlass" principle. Basically, this can be visualized as several turns of rope wrapped around a drum, one end of which is connected to a load and the other end to the source for control. When no force is exerted on the input end of the rope, slip exists between the rope and the drum and no output force results. As a force is exerted on the input end of the rope, an amplified force exists at the output end.

The mechanical amplifier as actually being used has two such drum-band combinations, mounted back to back, thus providing bi-directional output. Gearing is also employed in the unit to supply a rotating output. Rating of the mechanical amplifier is 1.66 hp.

Other components in the system are a displacement transducer whose movable core is connected to a stylus, a power supply, and an electronic amplifier. The transducer provides control signal information in the form of a low-level voltage directly proportional to the dimensional variations of a mechanical template. Output voltage reaches a null point for one position of its core. The magnitude and phase of the a-c output voltage is proportional to the amount of displacement and direction of displacement from null. Consequently, the transducer signals the direction and rate at which the load is to be moved.

Nultrax Systems

Latest developments in the design and application of Nultrax measuring and positioning systems were given in papers presented by Walter S. Parks, Westinghouse Electric Corp., and Frans Brouwer, Canadian Westinghouse Co., Ltd.,

Heart of these systems is the Nultrax transducer which gives a high degree of accuracy and repeatability to the electronic control or measurement of position.

Accuracies of one part in 100,000 are not uncommon in numerically-controlled machine tools or in gaging applications where precise linear measurements are required.

The Nultrax transducer is made up of two basic parts. The primary part consists of a long steel bar in which two grooves are cut in the form of a two-start spiral thread. These grooves hold the primary winding, the two wires being joined at one end of the bar and connected to slip rings or terminals at the other end. This produces a long bifilar coil. The secondary is also a bifilar coil, located on the inside of a steel sleeve. This sleeve fits around the primary bar and is free to slide along its length. The unit, in essence, is a differential transformer which gives an electrical output that nulls in the measured position. The position of the electrical null may be located anywhere along its length by rotation of the primary element.

The Nultrax may be used in either a closed loop positioning system or a manually-controlled measuring system. In the closed loop positioning system, information is fed to the system which automatically produces a signal relative to linear position. This signal is used to move the machine tool or table to its correct position as dictated by the numerical information fed to the system. In the measuring system the manual controls are used to move the table to which the Nultrax sleeve is attached. The resulting signal is fed to a readout device which indicates the correct position.

In the systems for machine tool applications, the logic functions are performed with static transistorized elements. These units comprise the transducer feed oscillator and modulator, the signal amplifier, the demodulator and the stabilizer unit. All packages are of plug-in construction.

It was stated that read-in measuring systems can easily be converted to positioning systems, and that manual positioning systems may be modified for punched-card or punched-tape controls by using the Nultrax system. Also that positioning systems are thus made readily adaptable to common forms of input equipment such as tape and card readers or manual input.

Applications of the Nultrax system include the following: It was applied to the leveling of the horizontal rail of a large planer milling machine, utilizing a null meter to indicate the sense and magnitude of a deviation from level of ±0.002-in. Another application was a two-coordinate point-to-point positioning system installed on the table of a six-turret drilling machine. Machine control is either by manual selector switches or eight-channel punched tape. In this application, using two Nultrax transducers, accuracy in 10-in. travel is to 0.0001-in., with a repeatability of 50 microinches.

It was revealed that Westinghouse is negotiating for several continuous-path contour milling controls, and is building a two-coordinate contour milling control scheduled for completion in October, 1958.

A recent development is one in which the Nultrax transducer is geared directly to the main drive, eliminating the need for a separate servo for the transducer. In this application the transducer is no longer used in a pure null and its output signal is employed to measure small deviations from the null position. On a thread grinding machine, for example, with the Nultrax transducer geared to the drive, any deviations in the lead of the screw are detected by the transducer and a correction applied to the table position to compensate.

Machine for Large Parts

Described as a new approach to the problems of machining large irregular parts that require complex boring and the outside turning of flanges, details of an unusually big vertical boring, facing and turning machine were outlined by Robert E. Morton, Morton Mfg. Co. Occupying a floor area 30 ft by 33 ft, and weighing about 700,000 lb, the machine is designed to handle parts up to eight feet in diameter and eight feet high.

Typical operations which can be performed are: straight bores of 16 to 60-in. diam; circular inside-bore slots, including T-slots and hook-contoured forms; spherical or irregular contoured cylindrical inside surfaces; facing operations; and flanges and slots, finished with the outside turning ring equipment. The workpiece remains stationary.

A numerical positioning system for directing the boring heads is used. This controls both vertical and radial tool position. A novel visual indicator shows the operator tool motion and position by means of full-sized templates of the tool bit contour which trace tool position along a template of the workpiece cross-section. In addition, a closed-circuit television system is utilized. Its camera is secured to the boring head and transmits a picture of chip action and surface condition of the work to a screen at the operator's position.

High-Temperature Materials

In a talk entitled "Space Age Materials," E. C. Bishop, Westinghouse Electric Corp., outlined a number of possible methods for metal preparation, fabrication, heat treatment, and machining of high-temperature materials. He indicated that tungsten, molybdenum, niobium, and chromium appeared to offer the best sources for new high-temperature alloys. But pointed out that the basic problem here lay in the fact that these metals at or near their melting points react with air, most other gases, and any known refractory materials.

In discussing problems associated with the machining of some of the newer materials, Mr. Bishop mentioned a new method recently developed in Germany. It is called electron beam machining, and utilizes a beam of high-speed electrons focused on the work to drill a hole or cut out a pattern. To date the method has been used only on a small scale and mainly on ceramics and diamonds, but this speaker predicted that if new materials are developed which cannot be machined by conventional methods, some modification of electron beam machining may be adopted.

A close-up view of motor cover storage on monorail trolleys equipped with shelved racks above the main stores area, with guard netting in between. There are 45 of these ceiling installed monorails, designated for the various models, allowing for storage of up to 40,000 covers.

Efficient Parts Handling in

Motor covers are moved on trolleys to an elevating monorail lift where the elevated racks are lifted and transferred to ceiling installed monorails for storage.

THE new manufacturing and assembly plant of Evinrude Motors, a division of Outboard Marine Corp. in Milwaukee, assembles and ships 12 different models of outboard engine units. These units are complete, with gasoline engine, fuel tank, housings, starter, shaft, and propeller making up the assembly. To get efficiency and economy into the assembly line, while retaining enough flexibility to permit building the entire range of models, was the problem in planning the layout for this new plant. A high degree of mechanization was desired to hold assembly costs to a minimum.

Dispersed manufacturing requires that many parts be brought

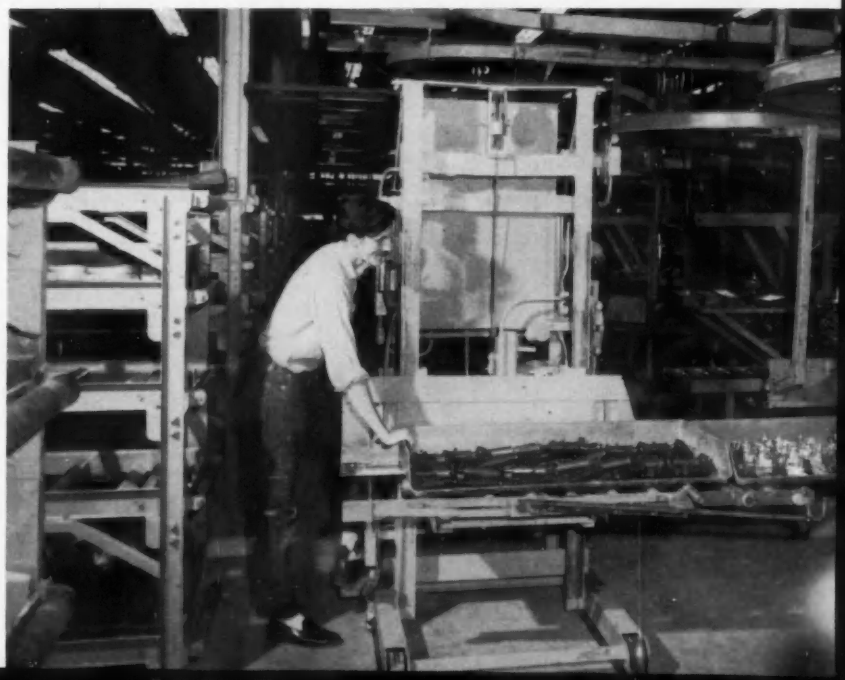
in from other plants, stored until needed, then moved from storage areas to the assembly line. Materials handling at the assembly plant involves facilities for moving parts to the main stores area, their proper storage there, and provision for moving them from the main stores area to the assembly line as required. Other facilities are: a mechanized assembly line, equipment for moving the finished and packaged product to final storage, and then to shipping.

Principal storage in the main stores area is in storage racks. To provide for ease of handling, the parts are stored in tote pans and skid boxes which are loaded onto the racks from one side, slide through to the opposite side, and are unloaded there. This gives first-in-first-out control without any manual shifting of tote pans.

The space above the storage racks is utilized also. Engine covers are rather large pieces of low weight per unit volume as stored. These are loaded onto trays or baskets on racks suspended from a monorail. The racks are carried on an elevator to monorails suspended from the ceiling of the stores area, and are run by gravity over switches and rails to a series of storage locations that fill the space between the floor racks and the ceiling. To prevent injury to anyone below by the accidental falling of a part, a mesh guard is installed just above the tops of the storage racks to cover the whole area. The racks remain suspended from the ceiling monorails until those parts are required in assembly.

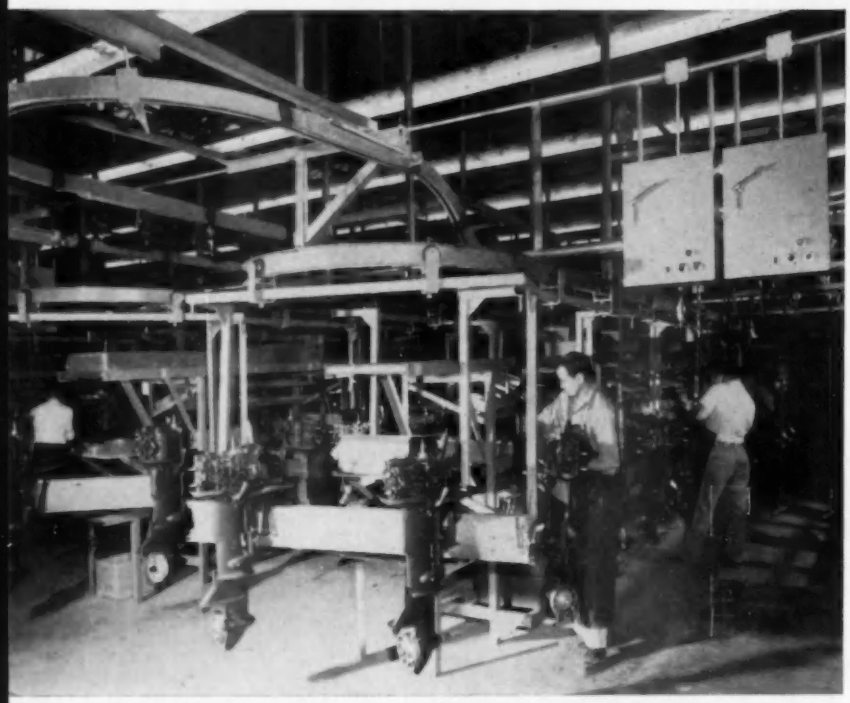
The breakout of parts from storage proceeds along several different lines. Parts that are essentially

NEW OUTBOARD MOTOR PLANT



Upper picture shows how parts are stored in tote pans on a seven-tiered rack equipped with rollers which allows for first-in, first-out selection of parts. Parts are code identified by colored cards as a means of controlling flow of materials through stores.

In lower picture the transfer of pallets from the sub-assembly stores distribution conveyor to the final assembly lines is done by a material handler who runs an electrically operated rail transfer car with an automatic lift. This car enables the material mover to pick off any pallet from the sub stores five-level conveyors to transfer the same pallet to any of the seven assembly lines.



Painted motors ready for final assembly are moved on special carriers on a paced monorail through the final assembly line where such sub-assemblies as carburetors, starters and wiring are attached.

in finished state, such as the propeller or the cover, are placed in monorail baskets as requisitioned, carried to the paint shop, and from there to the assembly line. Other parts, such as the slip clutch or the power head, are assembled from components in subassembly lines. For these, the requisitions go to the breakout station, kits are made up containing the proper number of each part, and the kits, in plastic trays are then pushed onto a four-level powered roller conveyor and carried to the subassembly line.

One other type of materials handling is used at this stage. Certain components, such as the generator, carburetor, and magneto, move directly from storage to final assembly, and these are picked up by a mobile mechanized transfer car, running on tracks the length of the storage area.

The plant is laid out to provide for seven final assemblies, with 15 subassemblies feeding in to them. Final assembly centers about the power head, which is assembled from one of the kits. The power head consists of the cylinder block, cylinder heads, pistons, crankshaft, and connecting rods. After a leak test, the completed power heads are conveyed by overhead chain conveyors to another assembly line, referred to as the rough rail assembly, where the power head is coupled with the lower unit, consisting of stern bracket, exhaust tube, gear case and propeller housing. The motor is then ready for painting.

The motor is removed from the rough rail by electric hoist and transferred to a chain conveyor which automatically conveys the motor through degreasing, washing, drying, paint spraying booths, and drying ovens. After application of base and finish coats the motor is conveyed to a carrier loading and transfer station, lowered to floor rails by a lift, the paint masks are removed, lubricant injected into the gear case, and a test propeller installed.

Motors then go onto a monorail C-carrier that can carry two motors, moved to the final assembly station where subassemblies such as carburetor, starter, and magneto are attached. The carrier with its two motors is then hoisted on an electrical lift to outgoing monorails, and on to a test booth where the motors are tested. After passing the performance test the units are deactivated on the lift at the transfer station, conveyed on monorails to the finish line, the regular propeller installed to replace the test prop, and gaskets and covers placed. The carrier continues on monorail through final inspection and packing.

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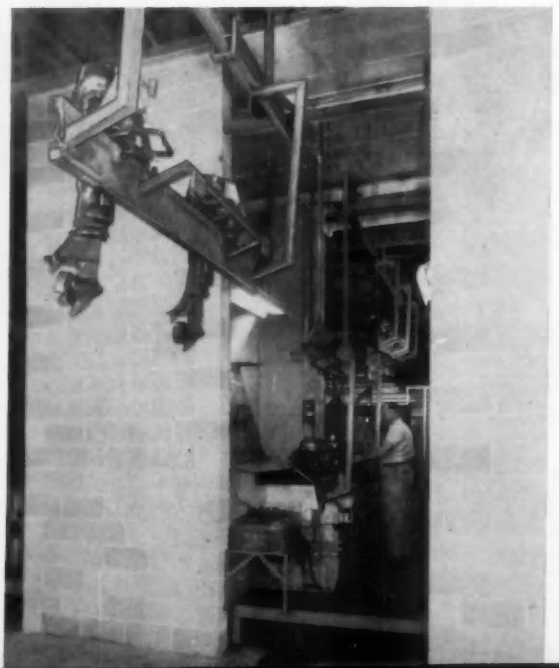


Motor carriers on a split monorail lift pass through the test booths where they are automatically lowered into the test tanks for final tests, then raised and moved by monorail on the carriers to the finish line.

• • INDUSTRY STATISTICS • •

WEEKLY U. S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

Make	Weeks Ending May 17	Weeks Ending May 10	Year to Date 1958	Year to Date 1957
PASSENGER CAR PRODUCTION				
Rambler	4,559	4,504	66,716	41,051
Total—American Motors	4,559	4,504	66,716	41,051
Chrysler	123	1,724	22,515	57,326
De Soto	1,616	59	15,327	61,906
Dodge	3,421	593	40,526	131,388
Imperial	.....	334	6,369	19,065
Plymouth	9,391	7,293	155,169	288,398
Total—Chrysler Corp.	14,551	10,003	239,906	558,083
Edsel	4	567	6,099	.....
Ford	18,144	12,556	396,806	638,161
Lincoln	449	478	12,715	20,073
Mercury	3,395	3,925	50,075	144,382
Total—Ford Motor Co.	21,992	17,526	465,695	802,616
Buick	5,026	4,181	109,322	200,326
Cadillac	2,596	3,226	59,678	66,267
Chevrolet	27,002	27,678	553,106	616,923
Oldsmobile	7,260	6,562	144,265	186,138
Pontiac	4,420	3,804	99,112	162,089
Total—General Motors Corp.	46,304	45,451	965,485	1,231,743
Packard	.....	52	1,325	4,522
Studebaker	.....	1,070	12,522	24,129
Total—Studebaker-Packard Corp.	.....	1,122	13,847	28,651
Checker Cab	98	97	1,626	1,846
Total—Passenger Cars	87,504	78,703	1,753,275	2,663,970
TRUCK AND BUS PRODUCTION				
Chevrolet	5,732	6,133	114,066	144,708
G. M. C.	1,112	1,149	24,670	28,258
Diamond T	101	110	2,117	1,825
Divco	60	60	1,164	1,493
Dodge and Fargo	1,519	1,448	22,031	34,044
Ford	4,967	3,878	68,690	142,556
F. W. D.	19	27	529	438
International	1,612	1,816	40,048	41,344
Mack	279	265	5,809	6,885
Studebaker	124	228	4,464	4,847
White	309	319	7,052	7,908
Willys	967	1,922	31,118	29,054
Other Trucks	70	65	1,225	1,728
Total—Trucks	16,871	17,420	343,883	445,088
Buses	60	55	1,446	1,746
Total—Motor Vehicles	104,435	96,178	2,096,604	3,110,804

RETAIL CAR SALES BY PRICE GROUPS*

NUMBER OF CARS

Price Group	March 1958 Units†	March 1958 % of Total	March 1957 Units†	March 1957 % of Total
Under $2,000	3,463	.92	1,011	.18
$2,001 to $2,500	237,377	63.31	340,213	60.88
$2,501 to $3,500	96,253	25.67	166,763	29.94
Over $3,500	37,853	10.10	50,824	9.10
Total	374,948	100.00	558,811	100.00

Price Group	Three Months 1958 Units†	Three Months 1958 % of Total	Three Months 1957 Units†	Three Months 1957 % of Total
Under $2,000	6,877	.65	15,546	1.10
$2,001 to $2,500	661,363	62.86	853,668	60.25
$2,501 to $3,500	276,522	26.28	416,263	29.38
Over $3,500	107,411	10.21	131,324	9.27
Total	1,052,173	100.00	1,416,801	100.00

DOLLAR VOLUME OF SALES

Price Group	March 1958 Dollars	March 1958 % of Total	March 1957 Dollars	March 1957 % of Total
Under $2,000	$ 6,153,048	.62	$ 1,543,797	.11
$2,001 to $2,500	546,644,436	55.08	767,415,040	52.67
$2,501 to $3,500	270,061,880	27.21	465,248,778	31.94
Over $3,500	169,577,521	17.09	222,536,314	15.26
Total	$ 992,436,885	100.00	$1,456,743,929	100.00

Price Group	Three Months 1958 Dollars	Three Months 1958 % of Total	Three Months 1957 Dollars	Three Months 1957 % of Total
Under $2,000	$ 12,135,576	.43	$ 29,732,086	.81
$2,001 to $2,500	1,544,299,572	54.88	1,904,813,810	51.91
$2,501 to $3,500	776,997,006	27.61	1,166,990,315	31.80
Over $3,500	480,571,124	17.08	567,893,373	15.48
Total	$2,814,003,278	100.00	$3,669,429,584	100.00

*—Calculated on basis of new car registrations, as reported by R. L. Polk & Co., in conjunction with advertised delivered price at factory of four door sedan or equivalent model. Does not include transportation charges or extra equipment.

†—New registrations of American made cars only. Does not include imported foreign cars.

REGISTRATIONS OF FOREIGN CARS

First Three Months

1958		1957	
Volkswagen	18,592	Volkswagen	14,645
Renault	7,438	M. G.	2,718
British Ford	5,442	Metropolitan	2,168
Hillman	3,219	British Ford	2,099
Simca	2,882	Renault	1,952
All Others	28,072	All Others	10,499
Total	65,645	Total	34,069

1958 NEW REGISTRATIONS

Based on data from R. L. Polk & Co.

NEW PASSENGER CARS

Make	March 1958	February 1958	March 1957	THREE MONTHS 1958	THREE MONTHS 1957
Chevrolet	109,085	92,339	128,586	305,452	333,940
Ford	86,524	71,630	139,070	238,092	359,196
Plymouth	33,720	27,066	60,198	93,686	144,721
Oldsmobile	28,546	24,760	39,132	83,005	101,512
Buick	24,561	21,343	43,312	73,197	111,624
Pontiac	21,396	18,551	32,950	61,590	82,164
Mercury	12,626	9,689	27,820	33,269	67,600
Dodge	11,625	9,802	25,589	33,094	62,383
Cadillac	11,968	9,763	13,968	32,584	36,618
Rambler	12,221	9,065	7,457	29,929	17,725
Chrysler	5,719	4,558	11,701	16,543	28,467
De Soto	4,638	3,917	11,543	13,604	28,417
Edsel	3,316	3,559	.....	11,903	.....
Studebaker	3,315	2,907	5,731	9,738	15,042
Lincoln	2,917	2,713	3,983	8,534	10,206
Imperial	1,372	1,244	3,760	4,608	8,407
Metropolitan	928	673	1,011	2,248	2,168
Packard	319	261	777	830	1,676
Misc. Domestic	354	126	2,340	710	6,193
Foreign	25,349	19,402	13,979	63,397	31,901
Total—All Makes	400,501	333,589	572,917	1,116,013	1,448,962

NEW TRUCKS

Make	March 1958	February 1958	March 1957	THREE MONTHS 1958	THREE MONTHS 1957
Chevrolet	19,378	16,885	25,166	53,912	68,755
Ford	15,343	14,045	24,860	44,004	56,400
International	6,833	6,403	7,806	20,758	22,116
G. M. C.	3,973	3,643	5,595	11,539	15,871
Dodge	3,355	2,806	4,286	9,194	11,487
Willys Truck	1,110	910	1,355	2,996	4,015
White	1,100	899	1,416	2,809	3,847
Mack	886	681	1,135	2,406	3,017
Willys Jeep	447	397	511	1,263	1,528
Studebaker	372	274	737	1,036	2,025
Diamond T	227	251	300	671	861
Divco	271	130	273	523	680
Kenworth	64	49	89	176	212
Brockway	58	51	70	172	158
F. W. D.	37	40	50	117	153
Peterbilt	33	30	33	84	114
Misc. Domestic	72	52	43	180	207
Foreign	1,696	1,599	950	5,104	2,332
Total—All Makes	55,450	49,136	74,668	156,954	193,776

Production Control Equipment Saves Time at Parts Maker's Plant

HANCOCK Manufacturing Co. has reduced production costs over $100,000 a year. They did it by installing a completely new method of electro-mechanical production control. The new equipment is installed in their Jackson, Michigan plant, which turns out door locks, hood and trunk latches, seat slides and other hardware for major Detroit car builders.

Before installing the control, Hancock found that costs on nonproductive downtime, piles of production control records and expensive over-runs were taking a big bite out of gross profits. These inplant costs had been cut to what management considered the "irreducible" minimum. et tYhey still loomed too high.

What the Telecontrol Does

The equipment now in operation links every machine in the shop to a central information office. Production management can see the entire plant operation in an instant. Fed into this central office is information on production time, downtime, and parts produced on each machine. In the multiple operation type of plant, which has press, welding, finishing and assembly sections, former methods of production control required hours of paperwork.

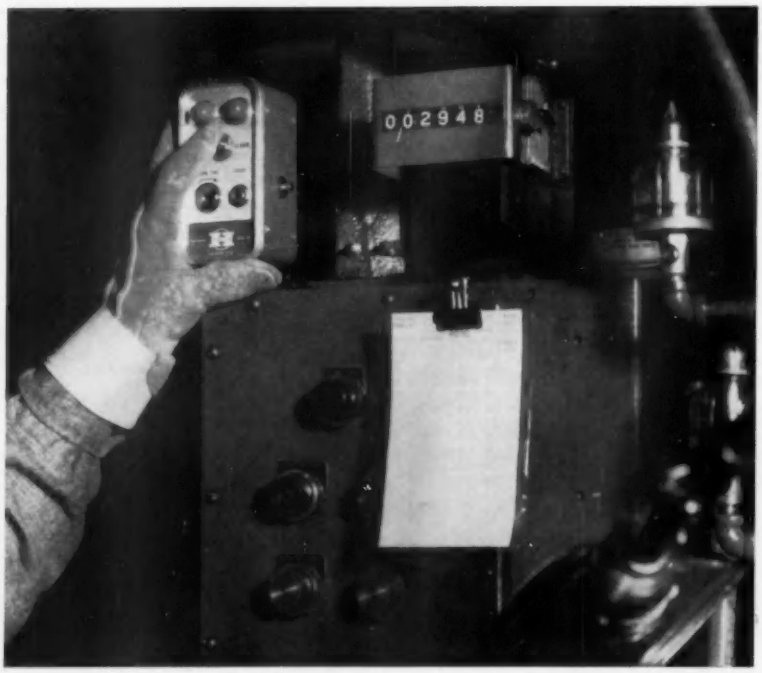
Now, however, all data from machines in the shop is electrically fed to the central office where it is automatically recorded in mechanical counters. No operator, foreman or timekeeper records are used. Each production machine or assembly station is equipped with automatic sensing devices. These pulse a signal through to the central office when the production cycle for each part is completed.

The central office, manned by two supervisory dispatchers, contains the heart of the "Telecontrol." One monitor and 10 control cabinets "supervise" two hundred work stations in the plant. The signals feed in through the monitor and are then routed to one of the control cabinets. Each cabinet receives signals from 20 machines, which are individually recorded on the 20 display panels, one for each machine.

The display panels show all incoming time and production data on counters. Each panel has four counters which indicate: Productive time elapsed in 0.01 hour units; downtime or unproductive time elapsed in 0.01 hour units; pieces produced to date; and the number of pieces still needed to complete the order.

Thus, at a glance, the production staff or management can scan the status of the entire plant's productive efforts. The information is delivered directly to the Accounting Department where it is used to determine job rate, piece rate, downtime, units produced and other necessary costing and payroll in formation. An add-punch machine records the information from the counters. This tape is used to produce punch cards for Accounting Department's use.

The monitor includes a graphic recorder for 40 critical stations. This is a 40-pen unit which pro-

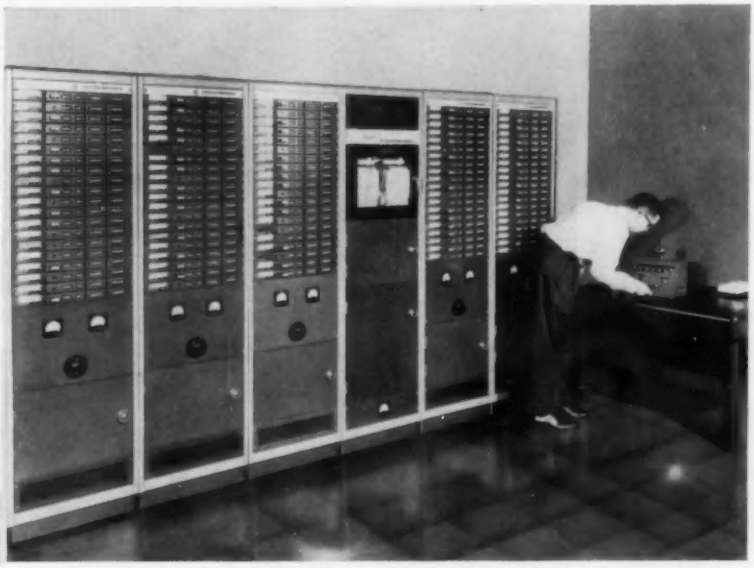


Each production station is equipped with a control box connected to a display panel in the production center. The box has a green and red light corresponding to the ones on the display panel. In cases of emergency, an operator throws the toggle switch on the control box and a warning red light starts flashing, both at the machine and in the center. The dispatcher then calls the nearest foreman to the machine.

vides a chart for future study of production flow and interruptions throughout the lant. The pens may be operated by any of the station display panels through a simple plug-in arrangement. A flow chart may be made of any department where bottlenecks occur.

As it is presently installed at Hancock, the system monitors and controls 200 work stations within the plant. However, as planned expansion takes place, the system can be increased by adding another monitor and additional control display panels.

Although it was designed for use in the Hancock plant, the Telecontrol equipment proved so effective that Control Systems Company, a Division of Hancock Industries, Inc., Jackson, Mich., now produces them for general industrial use.



The production control center is instantly notified of emergencies occurring at any one of the 200 machines or work stations throughout the plant. Here a dispatcher calls a foreman over the plant paging system as the result of an emergency signal by a machine operator.

How the Telecontrol Works

There is a small control box at each machine or work station. Into this control box are fed signals by the sensing device at the station. In addition, it contains a green and a red light, a reset button, an off-on toggle switch, a key-lock switch and a telephone jack.

On the display panel operated by the control box are four counters, a red and a green light, an activating jack and a card holder for job information. In order to activate this panel, a numbered plug, representing an operator, must be inserted in the activating jack to complete the circuit for that machine.

Each morning, before work starts, foremen and dispatchers decide what jobs will be handled during the shift. The dispatcher then sets up all the display panels to be used that day. He zeros all productive time, downtime and parts-produced counters. The parts-required counter is set to show the remainder of the order to be filled by that machine.

The dispatcher assigns men for the shift. He selects activating plugs bearing the numbers assigned each man and inserts them in the proper panel jacks. Without the plug the panel will not operate. The dispatcher can thus schedule the assignments for the entire shift. If an assigned worker does not report for that shift, the foreman notifies the dispatcher. The dispatcher selects another worker from the reserve pool and assigns him to the vacant work station. The activating plug is then changed for one with the replacement worker's number.

A master clock completes the circuit, turning on the green lights on the display panel and the control box at machine or work station. This ready signal indicates to the operator that production may start.

The sensing device at each machine or station is selected to fit the type of operation being performed. It may be a limit switch, photo cell, a mechanical gate, a micro-switch or other means. As each part is produced, the counting switch pulses a signal through the control box to the display panel. As long as the green light is on, the panel also registers production time in units of 0.01 hours. This elapsed time counter continues to register whether parts are actually produced or not, as long as the circuit is on and showing a green light.

When a production order has been completed, the number of parts indicated on the balance counter will have reached zero. At that time, the green light at the station's control box and its opposite on the display panel in the information center begin to flash. The worker stops producing parts, preventing over-runs.

One of Hancock's major problems had been to insure a constant supply of material to each station. Now when he spots a low supply, the operator switches on his control box toggle switch and goes on working. The toggle switch causes the red light on the control box and the one in the information center to flash.

Seeing the red light appear on the display panel, the dispatcher pages the nearest foreman to give him the number of the machine requesting help. The foreman now reaches the machine in seconds and learns of the operator's problem without extra downtime.

Each foreman carries a lightweight telephone handset attached to his belt. He plugs this into the jack on the control box at the work station and calls the dispatcher. The dispatcher then calls the parts man over the plant paging system and tells him where the material is

(*Turn to page* 104, *please*)

AUTOMATION NEWS REPORT

AUTOMATIC CONTROLS

PRODUCTION—VEHICLES—AIRCRAFT

By Samuel Cummings

ELECTRONIC DEFENSE

The Armed Forces will spend an estimated record total of $4.3 billion on "electronic defense" this year, according to Don G. Mitchell, chairman-president of Sylvania Electric Products Inc.

Mr. Mitchell made this prediction at the formal opening of Sylvania's new Amherst Engineering Laboratory in Williamsville, N. Y.

If this estimate is correct, he stated, "it would exceed the industry's total in all civilian and military fields only ten years ago." He attributed the record-breaking level to "amazing scientific breakthroughs" in missile and anti-missile systems; electronic detection and warning systems, countercountermeasures; and other electronic defense activities.

The new 85,000-sq-ft laboratory, described by Mr. Mitchell as "the nation's most modern facility for the development of advanced electronic equipment," is part of Sylvania Electronic Systems, a major division of the company. The new laboratory will specialize in research, development, design, and product engineering in communications, countermeasures, radar, and navigation. One of the laboratory's major programs is the production of the "electronic shield," which is the automatic defense system of the Air Force's Convair B-58 supersonic bomber. The shield was developed by Sylvania Electronic Systems.

Shortly after the opening of the laboratory, Sylvania announced a new 102,000-sq-ft facility for its new Data Processing Laboratory to be opened in July in Needham, Mass.

Henry Lehne, Sylvania Electronic Systems vice-president and general manager, said the work of the laboratory will include development of the Air Force Ballistic Missile Early Warning System (BMEWS) and the Army's Mobile Digital Computer (MOBIDIC).

FURNACE WITH A BRAIN

A new brazing furnace controlled by an electronic brain has recently been installed at the San Diego plant of Solar Aircraft Co. The new installation—a triple elevator setup—is believed to be the only one of its kind in the U. S. designed for processing on a production scale.

Heart of the new unit is a completely automatic system that controls all functions required for high-temperature furnace brazing. The system is designed to meter three types of gases—hydrogen, nitrogen, and argon; control every stage of furnace processing; and insure safe operation throughout the critical loading, purging, brazing, and cooling cycles.

It also indicates automatically the level of oxygen concentration in report and furnace atmospheres, measures furnace gases by specific gravity, measures their pressure and flow rates, and electronically operates solenoids, lights, buzzers, and horn signals.

Supplementing this bank of controls is a push-button console to control the vertical and horizontal movements of the furnace units. In addition, there is a two-zone temperature control panel into which previously programmed temperatures may be fed.

Material in the furnace may be brazed directly in one operation or put through a number of different heating and cooling stages as required by certain kinds of alloys.

The entire operation is programmed and fed into the installation's multiple-control system, which will execute almost any number or combination of processing conditions required for a given brazing sequence.

Once set and started, the installation is on its own; all the operator has to do is make adjustments called for by the system's lights and buzzers.

AIRCRAFT TEMPERATURE RECORDER

The National Bureau of Standards has developed a compact 96-point recorder for use in temperature studies on aircraft.

The recorder includes an electro-mechanical timer, a selector switch, four double electrical meters (each with two dials and pointers), a modified 16-mm movie camera, and terminal posts for connection to 96 thermocouples. All components are housed in a 20 by 20 by 10 in. aluminum box.

When the recorder switch is set for automatic operation, the timer causes eight of the thermocouple terminals to be connected to calibrated meters every ½ second. The illuminated dials of the meters and a frame counter are then photographed on a single frame of movie film. All readings are thus recorded in six seconds. This cycle is repeated continuously for 15 minutes — that is, until the camera has to be reloaded.

To get sufficient distance between camera and dials, the cam-

(*Turn to page* 104, *please*)

See SCHWITZER

FOR A New Approach

Schwitzer makes available to you a complete engineering service for the efficient solution of cooling problems based on forty years of experience.

Make use of improved designs that can be fabricated efficiently from an unlimited variety of highly developed large volume components.

A new approach by Schwitzer can give real overall savings and an improved product.

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PREVIEW *of the* 1958 NATIONAL Materials Handling Exposition

SOME 6000 pieces of equipment, valued at more than $5 million, are to be displayed by nearly 200 companies at the forthcoming National Materials Handling Exposition. About 18,000 executives and engineers from 25 countries are expected to attend the event—which is to be held at the Public Auditorium in Cleveland on June 9-12. Show hours are 12:00 noon to 5:30 PM daily.

The exhibits will emphasize new handling methods designed to reduce the cost of moving materials from the receiving lines, through production, and into distribution. In excess of 100 different basic types of mechanical handling equipment will be demonstrated. Even railroad sidings outside the auditorium will be utilized to show various types of loading and unloading techniques for freight handling.

On the following pages are brief descriptions of a number of the new products to be exhibited.

Concurrently with the show, The American Society of Mechanical Engineers will sponsor a conference on the overall theme of "Advances in Materials Handling." It is the first national conference on materials handling to be sponsored by the ASME since 1949. The four morning sessions of this conference will likewise be held at the Public Auditorium, opening 9:30 AM on June 9.

Conference speakers will deliver technical papers on various aspects of materials handling, including those of the "atomic and space age." There will be discussions on systems development, design and application of special equipment, automation, and handling techniques for non-mass production plants, among others. The program of the conference follows:

ASME CONFERENCE PROGRAM

MONDAY, JUNE 9

TECHNICAL SESSION I
Scientific Management in Materials Handling

Chairman: A. M. Smith, Vice President, The Lamson and Sessions Co., Cleveland, Ohio

Application of Operations Research to Product Movement
David B. Hertz, Manager, Operations Research Department, Arthur Andersen and Company, New York, N. Y.

Management Meets Competition Through Engineering
Arthur M. Perrin, President, National Conveyors Company, Inc., Fairview, N. J.

The Systems Engineering Approach to Materials Handling
Allan Harvey, Partner, Dasol Corporation, New York, N. Y.

Operating Characteristics of the Highly Automatic Plant
James R. Bright, Associate Professor, Graduate School of Business Administration, Harvard University, Cambridge, Mass.

TUESDAY, JUNE 10

TECHNICAL SESSION II
New Developments in Materials Handling

Chairman: Patrick P. Rizzo, Manager of Sales, Industrial Products Engineering Co., Long Island City, N. Y.

New Developments in Pneumatic Materials Handling—Improvements by Combination
Harry A. Markel, Jr., Chief Engineer, Fuller Company, Catasauqua, Penna.

New Developments in Industrial Bulk Handling
G. A. Tamblyn, Sales Manager, Industrial Handling Equipment, Materials Handling Division, Yale & Towne Manufacturing Co., Philadelphia, Penna.

Application of Advanced Materials Handling Techniques to Non-Mass Production Plants
Jeré Helfat, Booz, Allen & Hamilton, Cleveland, Ohio

WEDNESDAY, JUNE 11

TECHNICAL SESSION III
Design and Development of Special Equipment

Chairman: Carl J. Schwarzer, Manager, Automotive and Metalworking Sections, Industrial Sales Department, Westinghouse Electric Corp., East Pittsburgh, Penna.

Design and Construction of High Capacity Bulk Handling Equipment
R. C. Tench, Materials Handling Engineer, The Chesapeake and Ohio Railway, Richmond, Virginia

(*Turn to page* 105, *please*)

what's NEW at the MATERIALS HANDLING SHOW

FOR ADDITIONAL INFORMATION
please use reply card on Page 89

Public Auditorium
CLEVELAND
JUNE 9-12

Work Positioner

American Machine & Foundry Co. will display a self leveling work positioner. The unit is used to maintain gears at a convenient level while being handled in and out of finishing tools. A calibrated spring mechanism does the leveling. No external power source is needed. *Booth 516.*

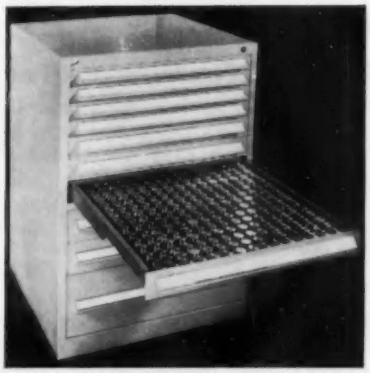
Circle 25 on postcard for more data

Modular Storage System

Vidmar, Inc., will display a storage system of the modular design engineered to provide complete interchangeability of cabinet components with an infinite number of interior arrangements to meet a wide variety of industrial storage situations. All housings measure 30 by 27¾ in., varying only in height.

The housing is completely flush with the floor. The locking system operates an entire bank of cabinets simultaneously by means of a single handle. *Booth 1117.*

Circle 26 on postcard for more data

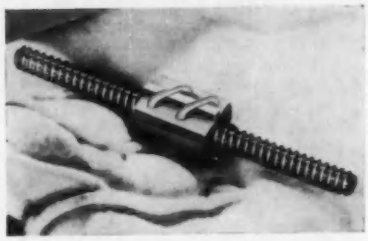


Vidmar storage system

Ball Bearing Screw

A miniature, lightweight ball bearing screw with only 3/16 in. ball circle diameter will be on display in the Saginaw Steering Gear Div. of General Motors Corp. booth.

Application possibilities include



Saginaw miniature ball bearing screw

electronic controls, missile and rocket guidance and telemetering systems, electronic machinery controls and other areas where critical positioning and control problems are encountered. It will position components to within 0.0005-in. for each inch of travel. *Booth 307.*

Circle 27 on postcard for more data

Grove Model 68 Hydraulic Yard Crane boom telescopes to 24 ft from bumper

Hydraulic Yard Crane With Eight Ton Capacity

Grove Crane Sales Co. will show the Model 68 Hydraulic Yard Crane. The Model 68 will lift and carry eight tons with the hook five feet from the front bumper. With the boom horizontal, it will lift and carry six tons with the hook eight feet from the bumper.

Special equipment includes a three-piece boom that will telescope hydraulically, under load, to a distance of 24 ft from the bumper and has a maximum hook height of 32 ft. Hydraulic stabilizer jacks enable the crane to pick up the same load over the side as it handles straight ahead. *Booth 1318.*

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what's NEW at the MATERIALS HANDLING SHOW

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Public Auditorium
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Airslide Conveyor

A working model of the Airslide conveyor system will be on display in the Fuller Co. booth. Fine, dry materials can be conveyed horizontally without moving parts by use of this new device. The horizontal-type conveyor can be arranged to avoid obstructions in its path by conveying material around an object or by elevating the material over it.

An important feature is the fluidized elevating columns. These columns extend vertically from the lower or downstream end of each floor course. In this way, the systems can be used in plant areas with limited head room. *Booths 613, 615.*

Circle 29 on postcard for more data

Roll-Along Warehouse Desk

The Cres-Cor roll-along warehouse desk will be on display in the Crescent booth. Made of aluminum, this desk is very lightweight and rolls along easily. It is 36 in. wide, 18 in. deep with an 18-in. collapsible leaf, making a working surface of 36 by 36 in. Any type of drawer arrangement can be had in this desk. *Crescent Metal Products, Inc. Booth 111.*

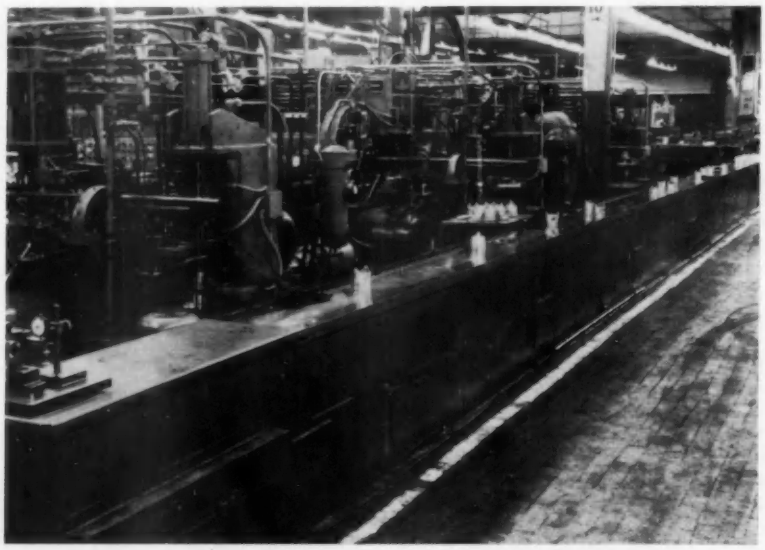
Circle 30 on postcard for more data

Crescent roll-along warehouse desk

Safety Step Ladders

A line of safety step ladders for use in the automotive, aircraft and construction fields will be on display in the Ballymore booth. The legs flare apart farther at the bottom than at the top so that the ladder will not tip easily. The models range from one to 12 steps, including a three-step "A" type unit, offering working heights of up to fifteen feet. They are available with treads of serrated anti-skid grating or expanded metal. *The Ballymore Co. Booth 1323.*

Circle 31 on postcard for more data



Sandvik Tru-Track steel belt conveyor system uses standard V-rope sheaves

Hardened And Tempered Spring Steel Conveyor Belting

The Sandvik Tru-Track conveyor which employs standard V-rope sheaves firmly bonded to the entire length of the inside of the solid steel belt will be displayed. The V-rope maintains positive tracking at all times and simultaneously provides the traction for the belt drive.

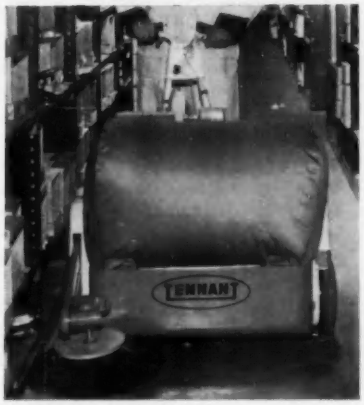
Positive alignment control permits the unit to operate within a fraction of an inch of adjacent work tables, side skirts or similar stationary or moving machine parts. The conveyor unit is readily incorporated as a component in various types of processing equipment. Belt alignment is under constant control even when the belt is operated on an incline or tipped sideways with one edge higher than the other.

Tru-Track conveyors can be equipped with the Sandvik water-bed arrangement for use in the continuous processing of hot materials. *Sandvik Steel, Inc. Booth 1129.*

Circle 32 on postcard for more data

Power Sweeper

A walk-behind power sweeper that sweeps a 34-in. path and is specially suited for congested areas will be on display. A high-speed 11-in. fan sucks dirt and dust into a 1900 sq-in.



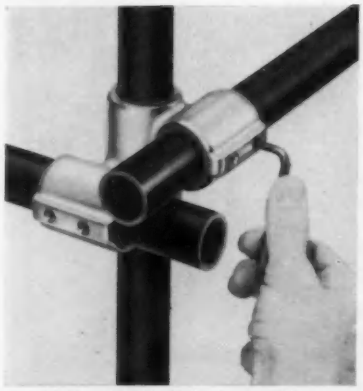
G.H. Tennant Model 40 power sweeper

fabric bag. The machine weighs 275 lb and the full-floating brush follows floor contours and has a pressure adjustment for heavy soilage areas. Called Model 40, the machine is powered by a 1 cylinder, 4 hp air-cooled engine. *G. H. Tennant Co., Booth 708.*

Circle 33 on postcard for more data

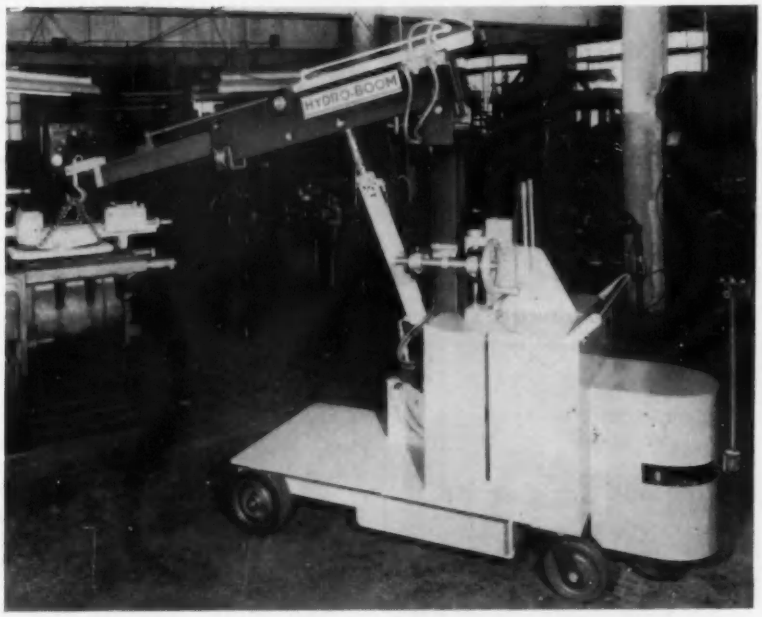
Slip-On Fittings

Nu-Rail slip-on fittings designed to facilitate a quick, easy method of pipe fitting will be featured in the Hollaender booth. They are made of an alloy of virgin aluminum and magnesium which has 35,000 to 45,000 psi tensile strength as cast, and elongation of 11 to 15 per cent. These fittings are used for machine stands and guard rails, railings, stock shelving, and pipe and bar rod racks. *Hollaender Mfg. Co. Booth 1526.*



Hollaender Nu-Rail slip-on fittings

Circle 34 on postcard for more data



Vanguard Hydro-Boom, Model 110 positions loads up to 2500 lb within 0.01-in.

Boom Truck Features Powered Hydraulic Action

The Hydro-Boom which enables operators to position work loads to within 0.01-in. in vertical, longitudinal and cross-wise directions of travel will be shown. Vertical and longitudinal travel is operated hydraulically and the cross-wise travel is mechanically operated.

The hook reaches 48 in. beyond the front end of the truck, keeping the truck away from the area to be serviced. Capacity at maximum boom extension is 1500 lb. Capacity with boom retracted is 2500 lb. Hydro-Boom units are available in hand or battery operated models with or without power propulsion.

Propulsion units are provided with a fluid coupling for smooth starts. All the controls are in the handle and they operate with the handle in any position. The "deadman" brake is normally on and is only released when the motor is running. *Vanguard Engineering Co., Booth 1530.*

Circle 35 on postcard for more data

Heavy Load Shipping Container Handles 6000 Lb

Broen Metal Products, Inc. will display a container which can be used for either inter and intra-plant handling or shipping. It is built of solid corrugated sheets securely welded. The capacity of the containers is 6000 lb. Available in two sizes, the containers are designed primarily for handling forgings, castings, stampings, etc. (Booth 1528)

Circle 36 on postcard for more data

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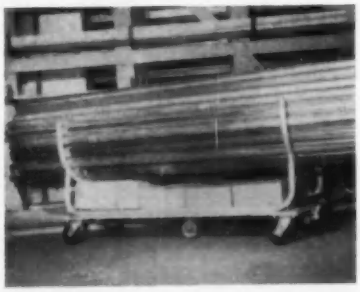
Pipe and Bar Carrier

Model T-RG, heavy-duty tube, pipe and bar carrier, will be included in the Rol-Away exhibit. Designed for machine shops, metal fabricating plants, factories and metal warehouses, it is of welded construction using 1¼ in. aluminum alloy IPS pipe.

A retractable fifth wheel called the "Rol-Guide" is mounted under the center of the truck. When retracted, the wheel is completely off the floor. Controlled by a small foot lever, the fifth wheel locks into position and is held in tight contact with the floor by spring tension. The truck then maneuvers freely, yet has the stability of a four corner mounted truck. *Rol-Away Truck Mfg. Co. Booth 1309.*

Circle 37 on postcard for more data



Rol-Away Model T-RG heavy duty carrier

Woven Wire Slings

Pennsylvania Sling Co. will display its line of woven wire slings used for handling various items such as dies and jigs. In a typical application the slings are used for turning heavy parts. Because of its construction, the sling flexes across its entire width, enabling it to wrap snugly and tightly around the load. Damage to the part is eliminated because there are no sharp, narrow strands to cut or nick the edges of the load.

The company will also show a standard 10,000 lb capacity model pallet lifter. The lifter has been developed to meet the need for handling heavy materials such as bundles of sheet steel, heavy dies and larger pallet sizes. It makes possible the handling of palletized loads by cranes and hoists in areas inaccessible to fork trucks. *Booths 406, 408.*

Circle 38 on postcard for more data

Gravity Storage System

The Quick-Pik gravity storage system will be demonstrated by the North American Equipment Corp. It is a completely adjustable stock selection rack. Items are loaded from the rear and automatically slide to selecting positions in the front. The system incorporates a means of making rapid adjustments to accommodate changes in parts size. *Booth 1522.*

Circle 39 on postcard for more data

Conveyor Drive

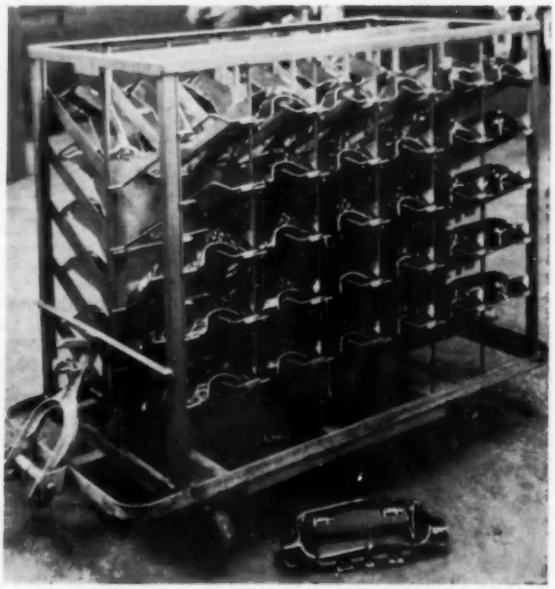
The Georg Von Opel booth will feature Bauer Drum Motors which are used for driving portable, mobile or stationary belt conveyors. The totally-enclosed construction allows continuous service under all conditions. No ventilation openings are required. The motor is a three-phase induction motor with high starting torque and low starting current. Special windings are not required. Gears are made of high-grade case hardened steel. No motor stands, couplings, reducers, V-belts, chains, sprockets or other protruding parts are required. *Georg Von Opel Corp. Booth 1538.*

Circle 40 on postcard for more data

Wire Racks For In-Process Handling Of Small Parts

Pictured is a typical wire rack, designed for in-process handling of small parts, which can be seen in the Edward Alden Wire Division booth. This rack is pulled along side of a punch press by a truck. As stampings come out of the press they are placed into the compartment provided for them. The rack is then moved on to the welding department where other components are welded to the parts. The rack is then moved to the polishing, burnishing and plating departments where the parts are taken in and out of the racks for processing. The whole rack is then used for storage and to transport the parts to final assembly. (Booth 403)

Circle 41 on postcard for more data



Cargo Trailer

A hydraulic elevating trailer for all-purpose hauling will be on display in the Easy Loader, Inc., booth. Introduced under the name of EZ-Loader, the unit has a hydraulically operated bed which lowers to ground level for easy loading and then raises to hauling position. It is unnecessary to detach the trailer from the hauling vehicle for loading or unloading. Tail gate forms a heavy-duty loading ramp as well as a secure body closure.

According to the manufacturer, the new trailer takes the lift out of loading, reduces loading hazards and simplifies load lifting and hauling operations. Rated at 2000 lb capacity, with ample safety factor, the unit is of all-steel construction and weighs approximately 960 lb. *Booth 1532.*

Circle 42 on postcard for more data

Adjustable Pallet Rack

Hartman Metal Fabricators, Inc., will be exhibiting a new Flexirack. Flexirack has been redesigned to give shelf stringers better appearance and greater strength. Flexirack is a fully adjustable pallet rack. The lift truck driver can move any adjustable shelf without leaving the seat of his truck.

Featured along with the Flexirack will be the new Hartman Booster which is a portable lift designed for applications where floor load capacities are limited, for work positioning, and for unloading trucks where docks are not available. *Booth 1326.*

Circle 43 on postcard for more data

Loading System

The Tri-Belt loading system, a type of permanent dunnage for rail freight cars will be on display. Two types are available. A permanent installation of horizontal steel side rails welded in position between standard AAR car lining. This system features a flush wall with no steel projecting into the car, increased cross member coverage, lower maintenance and an improved doorway member that can be removed from outside the car.

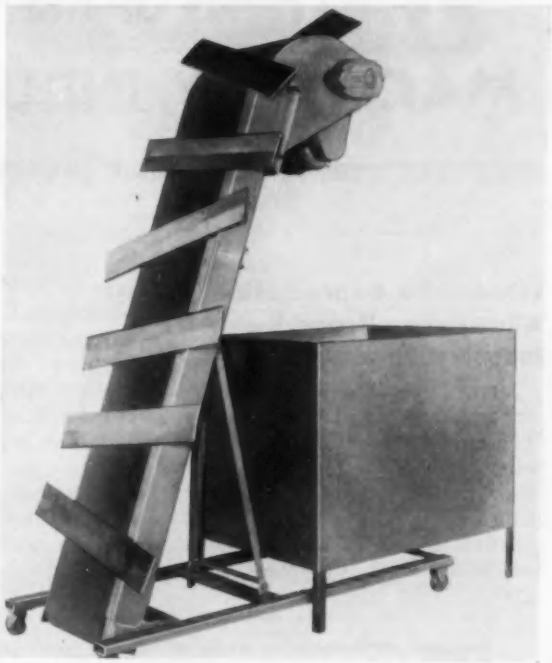
The second type is an adjustable installation with removable side rails which fit into T-slots in vertical channels. *Allied Steel and Conveyor Div., Sparton Corp. RR Siding.*

Circle 44 on postcard for more data

Self-Tracking Device Featured On Magnetic Conveyor

Bosworth Mfg. Co. will display their line of magnetic conveyor belts. These belts are designed to handle all ferrous objects, scrap, stampings, machined parts, etc. The frame is of channel formed steel side rails. Frame depth is 6½ in. Belts are available in neoprene or rubber in widths from 6 in. Drive is V-belt from motor to gear reducer and the gear reducer drives the pulley. All drive elements are shielded. Three types of stands are available. Usual speed requirements are 65 to 85 fpm. Belt speed can be varied by changing the V-belt and V-belt sheaves. (Booth 604)

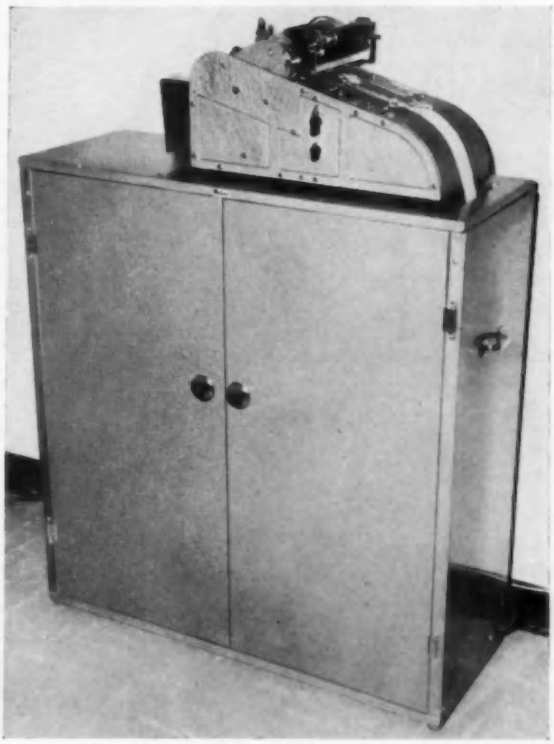
Circle 45 on postcard for more data



Automatic Label Printing Machine

Weber Marking Systems Co. will display the Model Dual-80, an automatic Label Printing Machine mounted on a new 36 by 36 by 12 in. power feed cabinet. The cabinet automatically feeds a 9500 ft roll of paper to the machine (enough for about 27,000 labels) which prints, counts quantity desired, cuts to size and stacks labels at the rate of 105 a minute. The cabinet sets on bearing casters and may be used with either the Weber stencil or rubber mat printing machine. (Booth 610)

Circle 46 on postcard for more data



News of the MACHINERY INDUSTRIES

By Charles A. Weinert

Industry Leaders Recommend Liberalization of Depreciation Allowance Policies Both As an Anti-Recession Measure and As an Incentive for Industrial Growth

Liberalized Depreciation Allowances Urged by Industry Leaders

James C. Zeder, Chrysler Corp. vice-president, recently urged a "liberalizing of our Government's policy on depreciation allowances" to provide increased incentive for industrial growth. His statement followed in the wake of a recommendation along the same lines made by A. V. Bodine, president of the National Machine Tool Builders' Association.

"Almost invariably the tools used by modern industry are replaced by new ones long before they show any serious signs of wear. Under present conditions we should be permitted to write off the cost of machinery at much faster rates than we used 20 years ago," Mr. Zeder told the Annual Conference of Engineers and Architects at Ohio State University.

He pointed out that during a recent trip to Europe he was deeply impressed with the remarkable economic recovery of West Germany. He cited that nation as an outstanding example of an economic system which provided incentive and whose income tax rates were such as to stimulate savings and the investment of risk capital.

He said those developments were made possible by two significant measures: (1) abolishing the traditional principle of using the original price in writing off obsolete equipment, and substituting current replacement costs as a write-off basis; and (2) permitting accelerated write-offs of new plants and equipment.

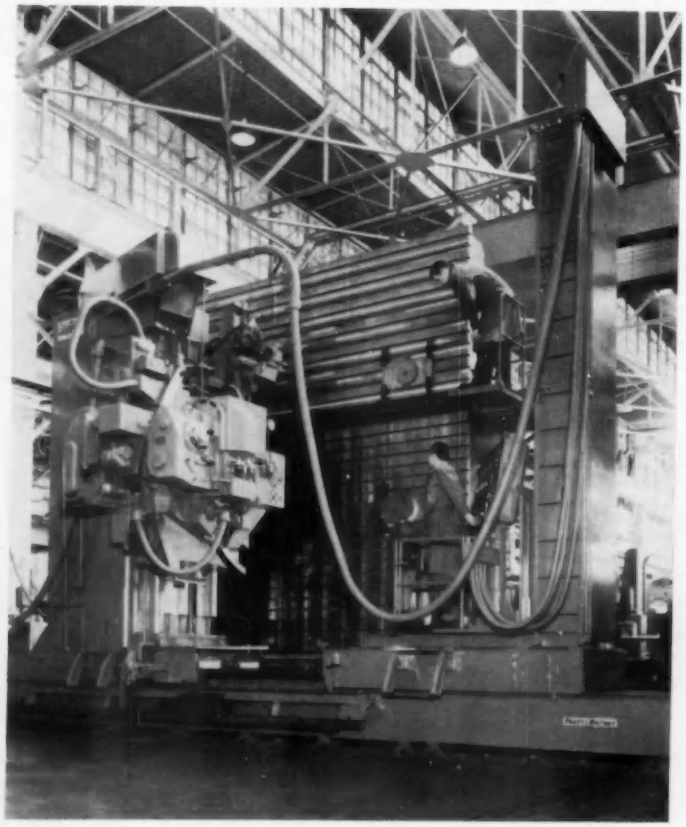
The latter measures, Mr. Zeder recounted, are similar to the write-off provisions which applied to U. S. defense plants during the Korean emergency and which permitted companies to recover quickly the money spent on new machinery.

A. V. Bodine, in a letter sent to Secretary of the Treasury Anderson, indicated that a revision of the "present outmoded depreciation policies of the Internal Revenue Service" applying to machine tools and other durable productive equipment would be "the most important anti-recession measure the Treasury could adopt."

Restrictive depreciation policies, he asserted, discourage investment in capital assets. "Manufacturers," said Mr. Bodine, "faced with the continuing threat of inflation and the new factor of obsolescence, will not buy machine tools and other productive equipment if they have

(*Turn to page* 112, *please*)

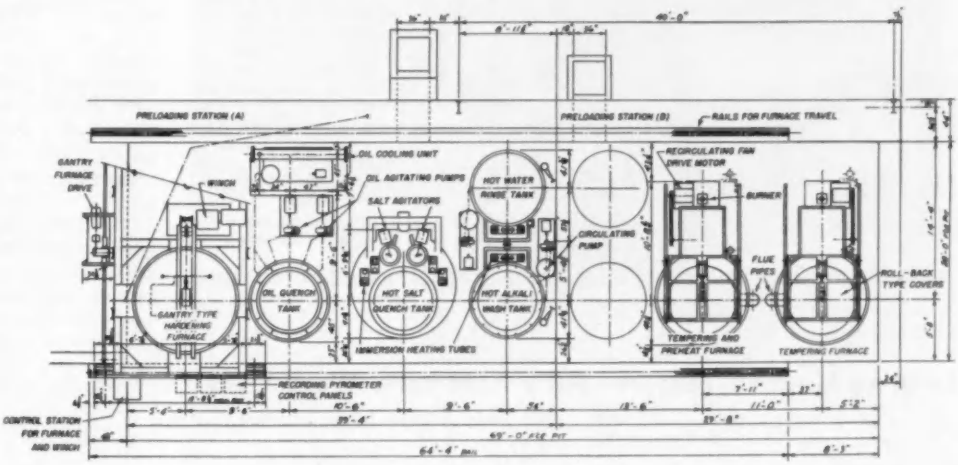
Designed particularly for profile milling of aircraft components, this new Keller is equipped with a special tracer-controlled tilting head to provide four-axis milling



NEW PRODUCTION and PLANT EQUIPMENT

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

Gantry Type Controlled Atmosphere Hardening Furnace for Landing Gear Parts



Lindberg gantry type controlled atmosphere hardening furnace for hardening guided missile and aircraft landing gear components improves metallurgical properties of the work being treated because the operator has better control over the work in process. With a capacity of 10,000 lb, the furnace can control hardness and carbon content within five per cent.

A CONTROLLED atmosphere hardening furnace with a frame structure raised on side supports so as to span over either a preloading station or adjacent oil and salt quench tanks has been designed for hardening guided missile and aircraft landing gear components.

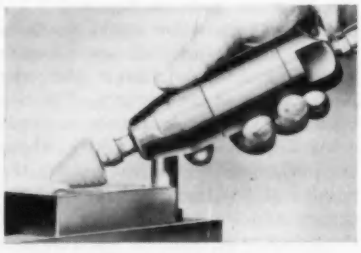
The furnace shell, 9 ft in diameter by 16 ft deep, is welded gas tight throughout to prevent contamination of the atmosphere by air infiltration and will accommodate a loading fixture with an effective work load 12 ft long by 5 ft in diameter. The work chamber is lined with high quality, lightweight refractory, backed by courses of medium and low temperature slabs. The result is a minimum heat loss and low shell temperature.

It is mounted on four 18 in. diameter wheels on 22 ft centers with rails which allow the furnace to travel along the length of the furnace pit. A motorized two-speed winch with an alloy chain lifts the work load into the furnace chamber. Control of the furnace door, winch and longitudinal travel of the furnace is accomplished from a pushbutton control station with operator's platform which is built into the left side of the furnace base structure. Three recording pyrometer control panels, one for each zone of control automatically control the required temperature in the furnace chamber. These three recording pyrometer control panels are also mounted on the side of the furnace frame work. *Lindberg Engineering Company.*

Circle 50 on postcard for more data

Small Wheel Grinder

THE Model 400-G heavy-duty small wheel grinder has been designed for general small wheel grinding on large dies, castings, patterns, etc. The tool is equipped with a positive lever throttle control for quick, safe starts and stops.



Airetool small wheel grinder, Model 400-G

A ball bearing pneumatic motor operating at 19,000 rpm powers the tool. Weight is 1½ lb and length is 6½ in. long, while the diameter measures 1½ in. *The Airetool Mfg. Co.*

Circle 51 on postcard for more data

Recorder Calibrator

A RECORDER calibrator has been designed for checkout and calibration of airborne analog tape recorders used in aircraft and missiles. The unit connects all circuits of the recorder and simplifies the problems of power supply, connecting wire leads and resistances for dropping signal currents. Voltages can be supplied to all circuits from a single 28 v d-c source. Voltages to supply bias current and motor drive are also available.

The calibrator is built for rack mounting, but is available in cabinet mounting. It is 19 in. wide, 7 in. high, 5 in. deep and weighs approximately 2 lb. *Aerophysics Development Corp.*

Circle 52 on postcard for more data

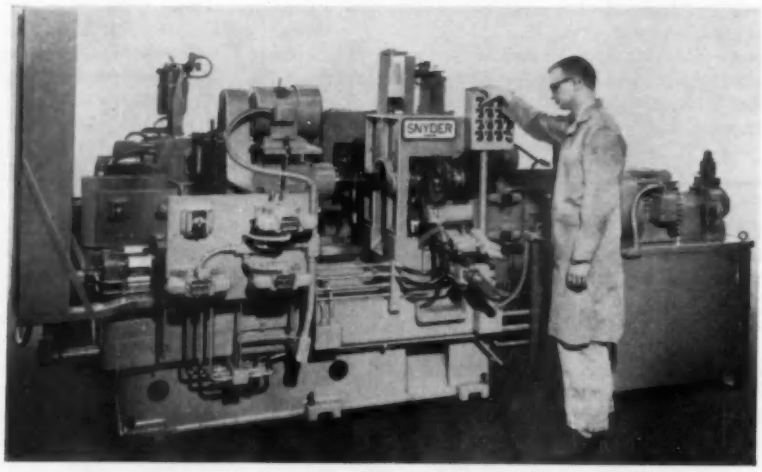
Taft-Peirce semi-automatic lapping machine. The table speed is variable between 16 and 76 rpm and the lapping compound is automatically supplied from a special tank which has a built-in agitator. The machine is of rugged, heavy-duty construction, the lapping plate is built in large proportions and there is a heavy-duty driving mechanism. It will handle a combination of both large and small parts on a fixed run basis and can be run virtually unattended.

Lapping Machine Features Fully Automatic Work Cycle

A 24-IN. semi-automatic lapping machine can deliver flatness to less than one light band and a surface finish as low as 1 microinch rms. It features a fully automatic work cycle, including the application of the lapping compound, a variable speed drive for selecting best lapping rate and specially designed magnetic truing rings which maintain continuous plate flatness while the machine is in operation.

It is designed primarily for lapping small parts in production lots but can accommodate any large casting or similar part that will fit in any one of the truing rings, which have a 8⅞ in. inside diameter. *Taft-Peirce Mfg. Co.*

Circle 53 on postcard for more data



Snyder combination unit utilizes automatic transfer and line index principles

Special Combination Unit Machines Tractor Track Rollers

THIS special machine tool uses transfer and line index automation principles to bore, drill, chamfer and tap four different track rollers for crawler-type tractors with minimum tool changes.

Essentially, the machine is a combination of a single-end boring machine and a line-index machine. Parts are first placed in a gravity-type loader where they roll into position in the boring machine. Finish-bored parts are transferred to the fixture in the machine by a hydraulic cylinder-actuated transfer mechanism. Then the fixture is indexed in sequence to three stations where six holes are drilled, chamfered and tapped. At the end of the tapping operation, a part rolls out of the fixture and the fixture is returned to its initial position where it receives another part. The machine produces track rollers at a rate of 39 pieces per hour.

The entire machine occupies a floor space approximately 12 by 17 ft. Five standard way-type machining units powered by one hydraulic pump and tank unit provide all of the machining functions. *Snyder Tool & Engineering Co.*

Circle 54 on postcard for more data

Name Plate Marker

THE basic unit of a new automatic name plate marker is the Pneumark 10T impact bench press. The stacker feed has adjustable features to accommodate rectangular plates 1 to 2 in. wide and 2 to 4 in. long by 0.014 to 0.024 in. thick.

This feed can be used with a serial numbering head for consecutive numbering. The plates are automatically stacked in numerical sequence after marking. Production rate is 3000 to 3600 per hour. *Geo. T. Schmidt, Inc.*

Circle 55 on postcard for more data

Sintering Trays

CAMBRIDGE Wire Cloth Co. has developed a wire cloth tray for the sintering and heat-treating of powder metal parts and other metal products. A wire clip is inserted around each corner in order to prevent the tray from failing at the corners. The clip starts at the inside corner, extends along the inside of the tray for about two inches, then runs through to the outside of the tray, back around the corner and through to the inside of the tray again. The clip has also been designed to allow for heat expansion.

Circle 56 on postcard for more data

Single Stroke Hand Truck

Two models of hand trucks having a 180 degree turning radii, Models AB and AEZ, have load capacities of 2500 and 4000 lb respectively.

The Model AB is furnished in standard platform widths of 17½, 24 and 26⅜ in.; Model AEZ in widths of 17¾, 24, and 26½ in. These load frames are welded into single units with rounded corners and parallel side members which form skid guides and prevent load shifting in transit.

With either model the operator is able to lift the load with the handle at any point within a 90 degree arc. Once the load is elevated in a carrying position, the self-locking lift hook disengages, automatically freeing the handle. The trucks are equipped with hydraulic load releases which cushion descending loads. Front and rear

Automatic single stroke hand truck

wheels are of heavy-duty construction equipped with either roller or ball bearings. *Automatic Transportation Co.*

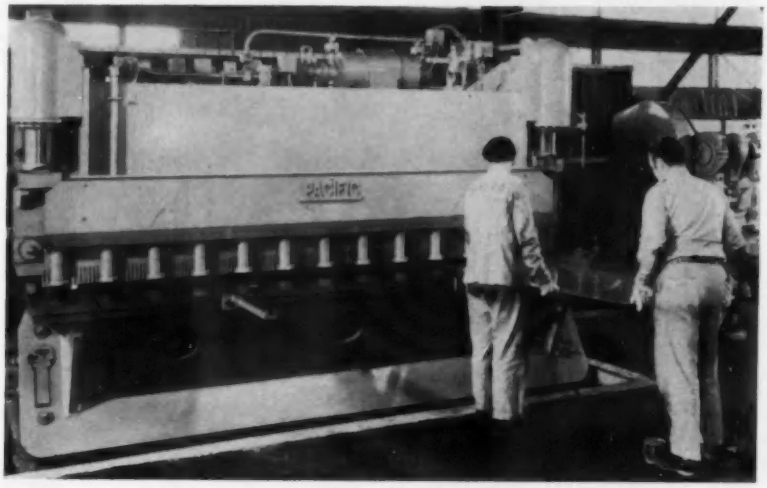
Circle 57 on postcard for more data

Precision Surface Grinder

Flats, slots, shoulders and shapes can be ground automatically to close tolerances on hydraulic powered Hydrabrasive precision surface grinders. By setting the automatic down feed to actuate either on the table reversal or saddle reversal, the equipment will operate to preset tolerances. Depending upon the finish required, the unit can be set for either 1, 2 or 3 spark-out passes before automatically shutting off.

The down feed is set from 0.0001 to 0.0025 in. on the elevating handwheel. This adjustment can be varied while the machine is running. *Abrasive Machine Tool Co.*

Circle 58 on postcard for more data



Pacific hydraulic shear can be stopped instantly in the event of an emergency

Hydraulic Shear Cuts Stainless, Aluminum, Ferrous Alloys

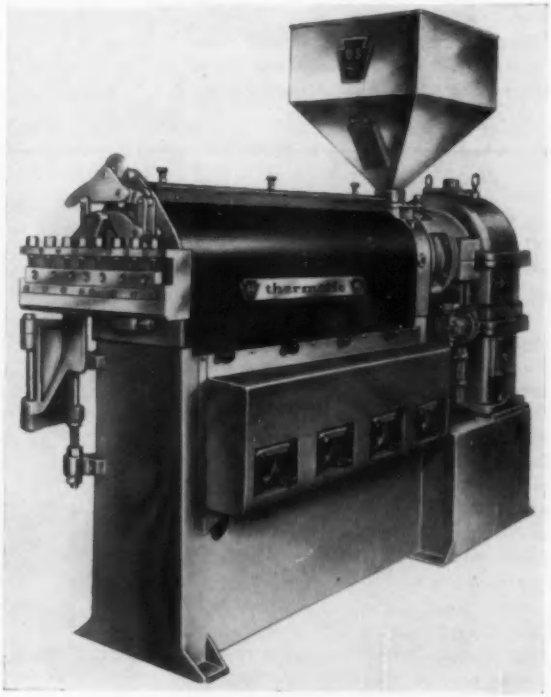
A hydraulic shear with rake angle adjustable to any metal thickness from 26 gage to ¼ in. cuts stainless steel, aluminum and most nonferrous alloys. Bending and bowing of drops, especially from light gage metals is eliminated. Rake is easily and quickly adjusted to the proper minimum angle for the particular gage. Operated hydraulically, the blade cuts smoothly, quietly, without shock on impact. Controlled by a portable foot pedal, it can be stopped instantly at any point throughout the stroke in an emergency. Cuts sheets from 4 by 12 ft to 7 by 19 ft. *Pacific Industrial Mfg. Co.*

Circle 59 on postcard for more data

High Production Thermoplastic Extruder

Specifically engineered to deliver high production in each bore size, the D-S Thermatic Thermoplastic Extruder Series is available in 2½, 3½, 4½, 6 and 8 in. models. Lubrication for the gear set is sprayed onto bearing and mating surfaces by a force-feed system which ensures complete lubrication, even at low operating speeds. A 4-keyway drive end on the stock screws eliminates eccentric tendencies at high rpm and increases load bearing capacity of the screw. In addition, an improved head clamp and hinge permits opening of the head with loosening only one bolt. The head swings clear of the front of the extruder and simplifies head alignment and change-over. (Davis-Standard, Div. of Franklin Research)

Circle 60 on postcard for more data



Sheffield Corp. Matrix 61, fine pitch gear grinder occupies 70 by 70 in. space

High Production Fine Pitch Gear Grinder

THE Matrix 61 fine pitch gear grinder is capable of grinding 200 diametrical pitch gears. The teeth are ground from the solid by the Crushtrue process. The grinding wheel, similar to a large diameter hob, or worm, has the basic rack form incorporated into its periphery. Thus, the machine is of the full benerating, continuous indexing type; giving the fastest possible production.

Significant machine specifications include maximum pitch of 16 DP, minimum pitch of 200 DP. The maximum diameter of work is 6 in., minimum is 0 in. Net weight is 4000 lb. *The Sheffield Corp.*

Circle 61 on postcard for more data

High-Lifting Units

TWO high-lifting units have been added to the "Powrworker" line of battery-powered hand trucks.

The high lift pallet truck is designed to handle single-face pallets. The high lift platform truck has platforms available in lengths from 36 in. through 60 in. Both units will lift a 4000 lb load 130 in. or more, depending on the application. Overall width is 42½ in. A feature of both units is an articulated drive unit, which raises or lowers three inches to compensate for uneven floor conditions. This prevents loss of traction.

Both machines will travel two mph loaded and have a lift speed of 12 fpm loaded. Either a single row or double row 12 v battery can be used. With single row batteries, the machines are less than 32 in. longer than the load. Without batteries, the high lift pallet truck weighs 3310 lb and the high lift platform truck weighs 2950 lb. *Clark Equipment Co.*

Clark "Powrworker" high lift platform truck

Circle 62 on postcard for more data

Right Angle Probe

A NEW right angle probe permits non-destructive measurements of most coatings and films on the inside diameters of pipes, bores in castings, etc., down to ½ in. ID. Each reading takes two seconds on the electronic instrument, which operates on eddy-current principles. These probes can measure a wide variety of metallic and non-metallic coatings such as plating, anodizing, paint, plastics, and ceramics. *Unit Process Assemblies, Inc.*

Circle 63 on postcard for more data

Turret Punch Press

THE 80-ton RA-101 turret punch press, using an optical positioning system, is used to locate holes to a non-dimensional full size drawing and to efficiently pierce parts.

The metal to be pierced is secured to the movable cross-slide of the press in direct relation to the drawing, or template. This cross-slide is moved manually in any direction until the magnified center lines of a hole location on the template line up with the cross hairs on a large glass screen. The press is then tripped, and the operator proceeds to the next hole location.

All punches and dies normally required are carried in the turrets ready for use. Die set-ups are eliminated. Any tool can be brought into piercing position in five seconds or less by rotating the power operated turrets by means of a foot switch. *Wiedemann Machine Co.*

Circle 64 on postcard for more data

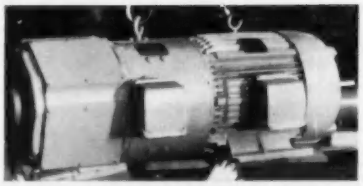
Miniature Reamers

A LINE of miniature reamers has been designed for use wherever a microdrill is used or wherever very small holes are required. These reamers are miniatures of larger straight shank straight flute reamers, ground from the solid and provided with end relief. Tolerances are +0.0002 in. to −0.0000 in. *Lavallee & Ide, Inc.*

Circle 65 on postcard for more data

Adjustable Speed Drives

A PACKAGED adjustable-speed drive in which an ac and a dc motor and semi-conductor and rectifiers are integrated provides continuously va-



Westinghouse Rectiflow adjustable-speed drive

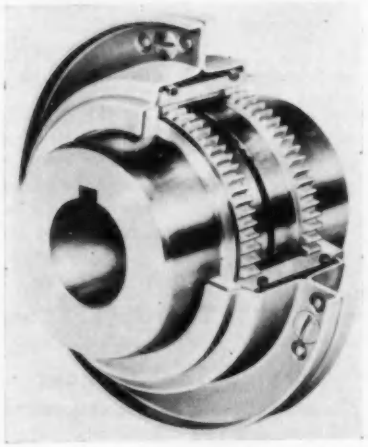
riable speed control over speed ranges of 1½ to 1, 2 to 1, or 3 to 1; maximum speed is 1690 rpm. All power requirements are supplied from normal ac distribution systems.

Named Rectiflow, these drives have been applied to precision wheel grinders and other applications include machine tools of various types, variable speed pumps and variable frequency m-g sets. *Westinghouse Electric Corp.*

Circle 66 on postcard for more data

Flexible Coupling

THE type MC flexible coupling is for shaft diameters up to 1⅞ in. It is designed for use as a motor coupling



Link-Belt low cost geared flexible coupling

for transmitting electric motor power to pumps, generators, speed reducers, etc.

A special feature is the use of spiral cam-locking fasteners which join the cover flanges. These fasteners are permanently assembled as part of the cover halves and require only a quarter turn for fastening or detaching. *Link-Belt Co.*

Circle 67 on postcard for more data

Eight Spindle Machine Finishes 120 Pieces Per Hour

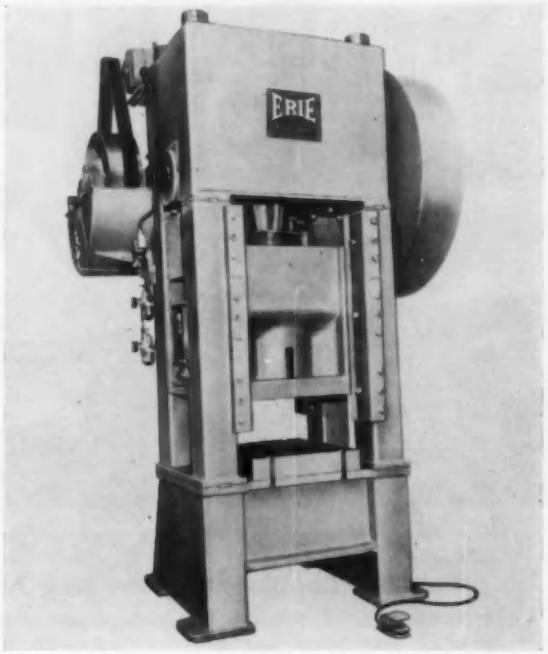
Designed primarily as a deburring unit, this Roto-Matic can also be used for polishing and surface improvement, obtaining fine micro-finishes and stress relief. Deburring and polishing can also be done on the inside diameters of parts, such as inside gears and hydraulic pistons. The fixture-actuating mechanism is air-operated and is automatic, or linked to a foot pedal at the operator's station. This works in conjunction with a cam-operated, automatic spindle raising and lowering device also located at the operator's station. It can be set on any flat surface and needs only a connection to a three inch drain and to plant fresh water, air, and electrical systems. One operator handles all controls from one station. (Roto-Finish Co.)

Circle 68 on postcard for more data

Versatile Line of Trimming Presses

A line of single point, straight side presses primarily designed for trimming forgings, is also usable for stamping and drawing operations. The press frame is of 4-piece construction, and uses pre-stressed strain rods for rigidity. The press features central forced lubrication, air counterbalance, and power ram adjustment. An air-operated, friction type clutch is used which is engaged by compressed air and released by springs. The press can be supplied in various speeds and strokes and in sizes from 150 to 600 tons. All parts which may need servicing are readily accessible, assuring maximum press operating efficiency. (Erie Foundry Co.)

Circle 69 on postcard for more data



Multiple Spindle Machine Drills-Taps Simultaneously

This multiple spindle machine drills and taps simultaneously and achieves a production rate of 400 parts per hour. It is available with 16 or 24 spindles. Half of the spindles, located on one side of the head, are used for drilling, and are driven by a standard electric motor. Those on the other side are driven by a high-reversal-duty hydraulic tapping motor. Loading is accomplished during machine operations, and unloading is automatic as parts drop down a chute. During processing, parts are located and held by spring loaded locating pins. A rotating table can be used to maintain high production rates where operations are such that additional locating or clamping means are necessary. (National Automatic Tool Co., Inc.)

Circle 70 on postcard for more data

Yale & Towne 8000 lb capacity bin dumping attachment rotates a full 360 degrees

8000 Lb Capacity Bin Dumping Attachment

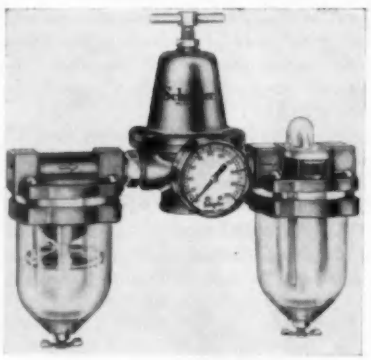
AN 8000 lb capacity, rotating bin dumping attachment has been developed for a line of industrial lift trucks. The attachment can handle bins ranging from 30 to 34 in. in width, 23 to 32 in. in height and up to 48 in. long.

Two hydraulic cylinders control the heavy-duty upper arms of the attachment which lower to hold the bin firmly in place against the attachment for rotating and dumping. Heavy duty, welded, 7 in. face forks are used to further improve the security with which the bin is gripped. The attachment rotates a full 360 degrees in either direction to speed handling operations. *The Yale & Towne Mfg. Co.*

Circle 71 on postcard for more data

Air Line Equipment

A DEVICE that filters air, regulates pressure and lubricates air lines is available from A. Schrader's Son,



A. Schrader's "Lub-Air-Ator" for air lines

Div. of Scovill Mfg. Co., Inc. Named the "Lub-Air-Ator," the unit has no moving parts and can be serviced without disturbing pipe connections.

It regulates line pressure down to 5 to 125 psi. The body, bonnet and all interior parts of the unit are corrosion resistant and fully replaceable.

Circle 72 on postcard for more data

Carbide Tool Grinder

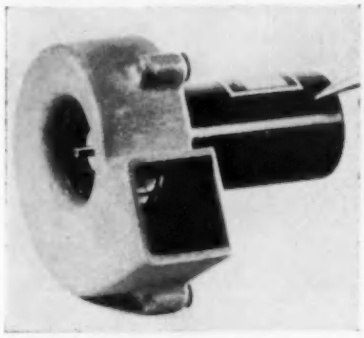
CARBIDE throwaway tools can be ground with sides flat and parallel within 0.0002 in. on a new machine. The machine will grind the entire periphery including the radius in one operation. It will grind any shape tool, including squares, triangles, pentagons, diamond shapes and rounds. It will grind any radius from 0.010 up. Also negative and positive rake tools and will hold a 0.0005-in. tolerance so they can be used again at a fraction of their original cost. *Harvill Machine Co.*

Circle 73 on postcard for more data

Centrifugal Blowers

FOUR models of ac centrifugal blowers, featuring an aluminum scroll for environmental protection and ruggedness, incorporate either a 1½ or 2-in. rotor, and deliver up to 45 cfm free air.

The units can be furnished with either a rectangular or a round outlet



Globe miniature ac centrifugal blowers

for attaching ductwork. Motors may be designed for frequencies between 50 and 1000 cycles with voltages up to 2000 v, single or three phase. Total weight of each unit varies from 16 to 19 oz, depending on the rotor size. *Globe Industries, Inc.*

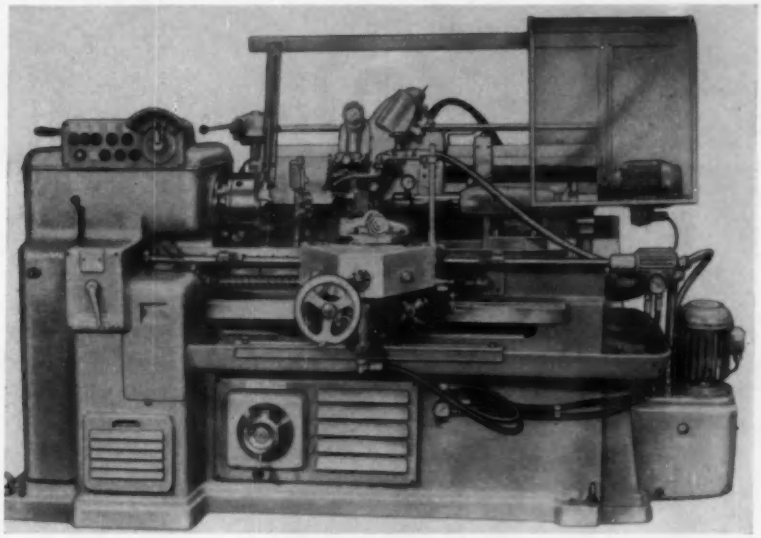
Circle 74 on postcard for more data

Insert Type Toolholder

THE Varirake insert type toolholder will permit changing of rake and relief angles without removal of the toolholder. The device features an indexable tapered support plate under the indexable throwaway cutting tip. A triangular support plate is used with a triangular throwaway. The top surface of the plate is out of parallel with the bottom surface, the height of the plate varying at each of the three corners. With the throwaway having uniform thickness and parallel top and bottom surfaces, an indexing of the support plate varies the top rake of the tool.

Each of the two support plates offer a choice of three top rake angles appropriate for machining work of a certain class requiring a specific relief angle. The two standard plates will provide for machining brittle brass, cast iron, or other materials that give short, easy broken chips; ductile ferrous materials; and aluminum or other high-ductile metals. The toolholders will be available in two shank sizes and six styles. *United Tool Co.*

Circle 75 on postcard for more data



Man-Au-Cycle Model 13-36 performs facing, turning, copying, threading operations

Lathe Performs Various Operations With Single Chucking

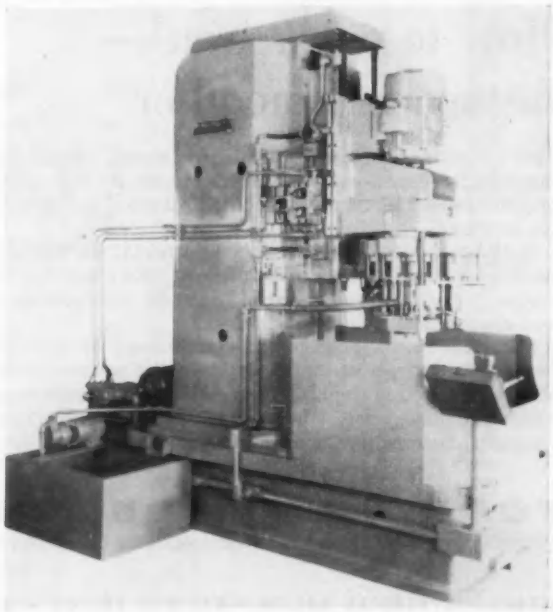
AN automatic threading lathe, Model 13-36, is capable of tracing, turning, facing, cutting off and automatic cycle threading, with a single chucking operation. The need to chuck the workpiece only once, guarantees concentricity, even when holding on rough diameters. Simplified single point tooling for every one of the operations results in fast, precise production.

Tracing is performed internally and externally from a master which can be a duplicate of the workpiece. The slide is mounted in a 30 degree vertical position whose movement is supported by ways which are parallel to the axis of the work. This permits complete tracing access to the full swing over the bed of the machine. *Man-Au-Cycle Corp. of America.*

Circle 76 on postcard for more data

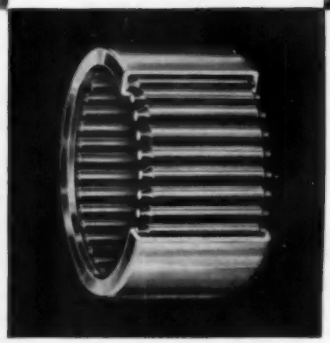
Four Station Vertical Indexing Machine

Millholland 4-station automatic dial type indexing machine, equipped with a hydraulic way-type unit and a 12 spindle head performs operations on both universal flanges and yokes. The hydraulic way type feed unit provides a complete feed cycle consisting of rapid advance, two rates of feed which are independently adjustable, and rapid return. The cycle is automatic, but may be changed by changing dogs and feed rates. A manual lever is also provided whereby the operator can control the slide for setup purposes. (W. K. Millholland Machinery Co., Inc.)



Circle 77 on postcard for more data

Massey-Harris-Ferguson, Inc. uses six Torrington Needle Bearings in the F-EO-20 and F-EO-35 Dyna-Balance Mowers for ease of assembly, compactness, smooth operation and long service life.



How to cut a swath— faster and smoother

First successful high-speed, vibrationless mower offered the American farmer is the Ferguson Dyna-Balance Mower. By eliminating vibration, operator fatigue is reduced, service life extended and production potential increased.

To keep friction low and operation smooth, six Torrington Needle Bearings are used on knife head and lever pivot pins. They contribute to easy assembly, light weight and compactness while providing maximum load capacity and long service life.

Such features have led to the extensive use of Torrington Needle Bearings in all types of farm and automotive equipment. If we can be of service to you in engineering Torrington Needle Bearings into your equipment, please call on your Torrington representative. *The Torrington Company*, Torrington, Conn.—and South Bend 21, Ind.

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Free INFORMATION SERVICE

Use either of these postcards for Free Literature listed below, or for more information on New Production Equipment and New Products described in this issue.

USE THIS POSTCARD

FREE LITERATURE

Steel Properties 1

A 40-page booklet describing the investment-cast properties of eight stainless and four low alloy steels is available from *Haynes Stellite Co., Div. of Union Carbide Corp.*

Plastic Laminates 2

Data sheet 8-1 describes copper-clad plastic laminates for electronic circuits. Sheet sizes, thicknesses of copper cladding and other information is included. *Taylor Fibre Co.*

Diamond Grip Collets 3

Diamond grip collets for turret lathes are described in Bulletin 20, four pages. *Sutton Tool Co.*

Hydraulic Servo Drives 4

A 12-page bulletin treats hydraulic servo drives for weapons systems developed and produced during the last 20 years and foreshadows future developments in this field. *Vickers, Inc.*

Welding Equipment 5

Bulletin NH-138 describes a crane-held cage assembly to carry control and wire-feed unit, and a welding equipment carrier cart with telescoping boom for control and wire-feed unit designed to provide increased versatility and work area mobility in semi-automatic welding. *National Cylinder Gas Div., Chemetron Corp.*

Epoxy Resins 6

Epoxy Resins are discussed in detail in an eight-page brochure. The booklet is a comprehensive summary of epoxy compounds in various industries such as metal forming, plastics forming, foundry practice and automotive and aircraft manufacture. *Marblette Corp.*

Caster Catalog 7

A revised catalog on a line of casters and wheels has been prepared by The Rapids-Standard Co. Details on the construction, size and application for the units are included in the 32-page publication.

Press Specifications 8

Bulletin 1958 is an easy specification reference on a line of power presses. Inclinable presses in both flywheel and back geared type, in tonnage capacities from 16 to 150 tons, are illustrated and described. *Johnson Machine & Press Corp.*

Voltage Regulators 9

A four-page illustrated brochure furnishes complete technical data on MVR magnetic voltage regulators and also serves as a technical manual. It covers detailed product description, principles of operation, operating instructions, and maintenance. *Sorensen & Co.*

(Please turn page)

VOID After Aug. 1, 1958 6/1/58

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Fork Lift Trucks 10

Bulletin BU-451 is a 16-page catalog which covers the FT series of lift trucks. Engineering, design, construction and operating details are included. *Allis-Chalmers Mfg. Co.*

Blower-Fan Catalog 11

An eight-page catalog describing miniature axial and centrifugal blowers and fans for electronic cooling, ventilating, and exhausting, is available from *Globe Industries, Inc.*

Milling Units 12

The line of Dupli-Mill tracer controlled milling units is described in 6-page Bulletin CRD-58. It gives specifications and features of these basic "building block" machines that can be mounted, fixtured and operated in any plane. *Colonial-Romulus Div., Colonial Broach and Machine Co.*

Flowmeter Data 13

Technical Bulletin 91-119 gives criteria for choosing the type of flowmeter to be used in measuring a given fluid or liquid. *Fisher & Porter.*

Annunciator 14

A four page folder describing a static-magnetic annunciator developed for monitoring complex automatic machine and continuous process operations is available from *Panellit, Inc.*

USE THIS POSTCARD

Replacement Cutting 15

Booklet 13-25-12, four pages, tells how to use cutting tools to best advantage and explains the importance of angle, shape and finish. Formulas for determining feeds and speeds are included. Another section is devoted to the Heald tool sharpener. *The Heald Machine Co.*

Work Driver 16

Bulletin D-57, 12 pages, describes a work driver which is designed for use on any type of engine lathe, or plain or universal grinder. *Seneca Falls Machine Co.*

Contouring Machine 17

A four-page bulletin describes the Olofsson Model 30-008 cam-operated precision contouring machine designed for combinations of boring, turning, facing, including tapers, contours, grooves, undercuts and chamfers. These operations may be performed alone or in combination with mechanical control of dimensional accuracy. *Olofsson Corp.*

Rolling Mills

Catalog FRM-58, 32 pages, covers a line of rolling mills. Included is the Fenn standard line, from 20 to 3 in. roll diameter mills, a complete section on mills for laboratory and advanced development, wire flattening mills, and a complete line of related accessories. Address request on company letterhead to *J. H. Charpentier, Sales Manager, The Fenn Mfg. Co., Newington, Conn.*

Production Facilities

A 54-page, three-color brochure presents a review of facilities for the production of components and systems for application to propulsion; electronic equipment for fire control, navigation, photographic and armament installations and can be obtained by addressing request on company letterhead to *United Aircraft Products, Inc., 1116 Bolander Avenue, Dayton, Ohio. Office of Technical Publications.*

Metal Working Machines

Brochure SC58M5 consists of photographs and descriptive text on machines for expanding, shrinking and roll forming metal. Among the machines shown are those used for the forming and sizing of jet engine, missile and rocket parts. Address request on company letterhead to *Customer Service Div., Grotnes Machine Works, Inc., 5454 North Wolcott Avenue, Chicago 40, Ill.*

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Gears are a special steel problem. Controlled grain size, freedom from porosity, segregation, and non-metallic inclusions are essential. Chemistry is critical.

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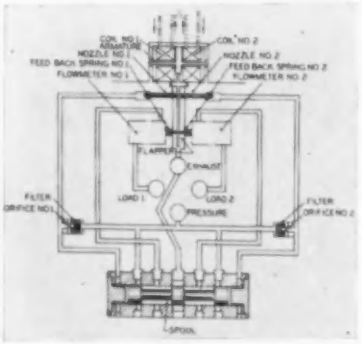
NEW PRODUCTS
AUTOMOTIVE-AVIATION

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

Electro-Hydraulic Valve

This electro-hydraulic servo valve has been designed to meet the stringent requirements of aircraft and



missile hydraulic servo systems. The valve design features fast response, low internal friction, minimum null shift, faithful reproduction of small input signals and insensitivity to variations in temperature and load or supply pressures. They are proportional flow control units and operate on a dynamic continuous flow sensing principle.

Total envelope for each model in the line is less than 10 cu-in. and weight is about 11oz. They will operate at ambient temperatures from minus 65 to plus 450 F and fluid temperatures from minus 65 to 400 F. *Pesco Products Div., Borg-Warner Corp.*

Circle 80 on postcard for more data

Nylon Flare Nuts

Polypenco nylon flare nuts provide a tight seal and can be temperature cycled up to 300 degrees F without leaking. In addition, they resist loosening by vibration and will not shear plastic tubings when overtorqued.

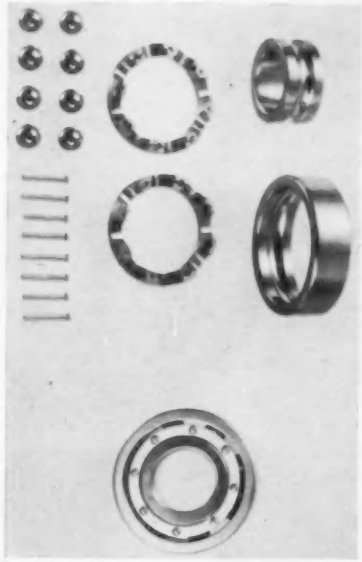
They are designed for sealing Nylaflow nylon pressure tubing to a metallic flare body. The nuts are standard S.A.E. 45 degree flare recommended for use in systems with maximum pressure of 250 psi. The nut yields under tension in the area of pressure on the flare providing a firm gripping action to compensate for flow tendencies of the tubing on temperature cycling. *The Polymer Corp. of Penna.*

Circle 81 on postcard for more data

High Temperature Bearing

A line of anti-friction bearings suitable for operation in ambient temperatures up to 900 F operate at speeds up to 40,000 rpm without lubrication. They are deep groove radial bearings, and are available in four sizes; 200, 202, 204 and 206.

Both inner and outer races are M-2 high speed steel. The riveted machined retainer is land riding, and

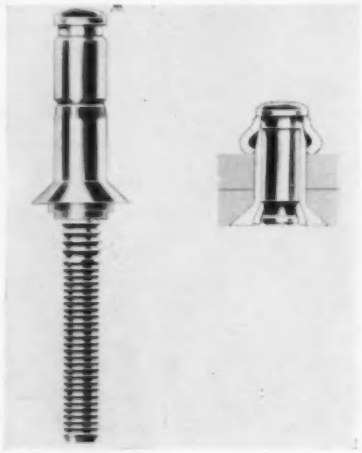


is made from either S-Monel or heat treated M-2. Balls are M-10 high speed steel. *Industrial Tectonics, Inc.*

Circle 82 on postcard for more data

Bolt Fastener

The Tau Bolt fastener, a hardened alloy steel blind rivet type, is available in a 3/16 in. diameter size, and a variety of grip lengths with either



countersunk or brazier head. Positive mechanical lock, high shear strength and high tensile preload are among the fastener's features. *Huck Mfg. Co.*

Circle 83 on postcard for more data

Low Level Altimeter

Designated the AN/APN-117, a low level altimeter designed for use in helicopters was developed to have special capabilities for hovering and for reconnaissance and rescue operations.

The radar set consists of two units, an electronic control amplifier and a control height indicator. It uses a standard receiver transmitter, housing and mounting base.

Applicable to all aircraft including helicopters, drones and missiles where low-altitude information is desired, the set is essentially a microwave altimeter which measures the surface or terrain clearance of an aircraft from 0 to 1000 ft. without the necessity of adding protruding external antennas. The set features a low-altitude expanded scale and improved readability of altitude information at lower altitudes. *Sylvania Electric Products, Inc.*

Circle 84 on postcard for more data

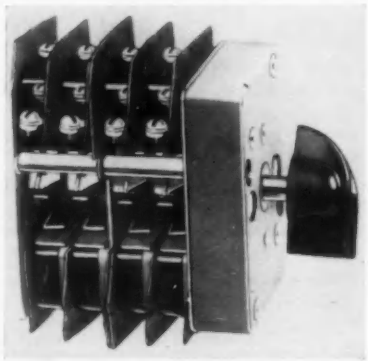
Self-Locking Nut

Multi-purpose Speed Nuts are designed for fastening pressed board paneling to truck interiors. The fastener acts as a spanner nut, bridging the open side of the truck body reinforcement panels. It is completely self-retaining and eliminates the need for welding, staking or riveting. In addition it is self-locking and serves as a cushion against cracking of the panel at fastening points. *Tinnerman Products, Inc.*

Circle 85 on postcard for more data

Rotary Selector Switches

Series 20AS rotary selector switches are capable of switching high currents in an almost unlimited number of sequences. Assemblies for



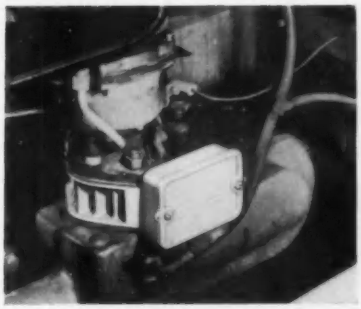
the basic switching units are grouped in rows of two on either side of the camshaft. Assemblies are built up from individual high precision switches, with each unit in the assembly individually tested.

Millions of operating sequences are available, since each basic switch is single-pole double-throw and has its own operating cam. The switch may be supplied without detents, for power operation, if desired. Electrical rating is 10 amp, 125, 250, or 460 v a-c; ½ amp, 125 v d-c; ¼ amp, 250 v d-c per basic switch. *Minneapolis-Honeywell Regulator Co.*

Circle 86 on postcard for more data

Engine Speed Governors

The National line of governors has been developed to prevent high speed racing of engines in lower gears. They are not affected by altitude changes, have no wearing parts, and are sealed to prevent tampering. They do not begin to operate until the pre-set top speed has been reached. Working on the velocity rpm principle, they control the



amount of fuel mixture that passes through the carburetor into the engine's combustion chamber.

Speed settings are controlled by setting a simple eye screw in the governor which positions the governor's butterfly valve to allow only the exact amount of fuel to flow through the valve for the top speed desired. *Stewart-Warner Corp.*

Circle 87 on postcard for more data

Brake Shoe Coating

A protective brake shoe coating, known as Ray-Bond, has been developed for post-bonded protection against rust, and to prevent the shoe from rusting until it is bonded. It is resistant to all oils, brake fluids and water.

The protective coating is available in three colors and all three are thermosetting, have synthetic resin base and can be sprayed or dipped on the shoe. *Raybestos-Manhattan, Inc.*

Circle 88 on postcard for more data

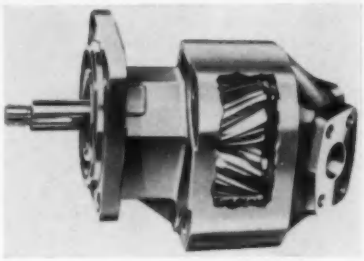
Adjustable Motor Base

Model MB-1, an adjustable motor base, offers an easy method of speed variation and belt take-up for fhp equipment with variable pitch sheaves. It has a maximum 1½ in. adjustment, precision-made telescoping slide, and lock nuts to limit movement. A knurled 1¼ in. knob and adjusting screw assure positive settings without slippage. The base can be universally mounted in any position. It is designed to handle all motors up to size 42 NEMA frame. The base measures 7½ in. long and 4¾ in. wide, with overall 1¾ in. height. *Rampe Mfg. Co.*

Circle 89 on postcard for more data

Rotary Gear Hydraulic Pump

A high-speed hydraulic unit designated the Hupp Hydroid Pump, features gears with an elliptical profile that eliminates trapping of liquid between teeth. The non-trapping feature permits speeds in excess of 4000 rpm with hydraulic pressures of more than 1500 psi. Flow rates from 3 to more than 250 gpm are available for specific applications. It is designed for materials handling, construction and farm vehicle, machine tool and aircraft hydraulic systems, plus other

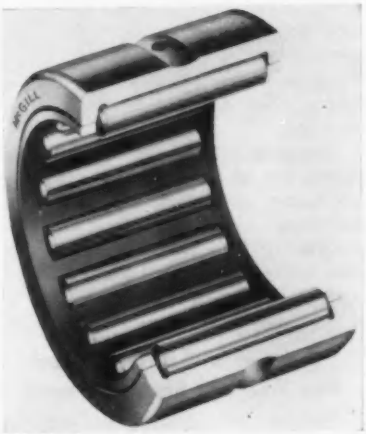


uses where high pressures and quiet operation are required. *Hupp Aviation Co., Div. of Hupp Corp.*

Circle 90 on postcard for more data

Cage Type Bearing

Cagerol bearings offer a cage type needle roller bearing construction in two standard sizes. Interchangeable with heavy duty needle bearings, this



retainer-equipped bearing will provide adequate capacity where excess misalignment prevents the use of full complement bearings. It is available with or without separable inner races. *McGill Mfg. Co., Inc.*

Circle 91 on postcard for more data

NEWS AUTOMOTIVE AND AVIATION

Continued from Page 39

New Aids Developed by Linde To Speed Curing of Rubber

Linde Co., a division of Union Carbide Corp., has developed a group of latent curing aids, called Chemical-Loaded Molecular Sieves, that it says will speed up the curing of rubber and plastics.

The company said the new products permit the use of vulcanizing agents previously considered too active or volatile for practical use.

The new development was made possible, the company reported, by combining Linde Molecular Sieves and highly active curing aids, which are locked within the pore structure of the Molecular Sieves by strong absorptive forces. The curing aids are thus effectively isolated from the rubber and resin formulation during the processing and storage steps. At curing temperatures, which are generally higher than processing temperatures, the active compound is released from the Molecular Sieve to speed up the curing action.

Molecular sieves, the company explained, are man-made crystalline alumino-silicate materials, with a high affinity for polar molecules which they absorb in preference to non-polar compounds. The materials used in the rapid curing of rubber and resin are generally polar compounds, which can be locked within the pore system of the sieves, and released when curing temperatures are reached.

Company officials said the loaded sieves can be used to cure a variety of rubber and plastics formulations including styrene-butadiene rubber, natural rubber, Neoprene, nitrile rubber, epoxy resins, rigid vinyl plastics, and others.

Pontiac Div. Lists Prices For Vauxhall Station Wagon

Pontiac Div., custodian of the English built Vauxhall, has announced port of entry list prices for the new Vauxhall Victor four-door station wagon. First shipments of the station wagon, which will join a Super four-door sedan on Pontiac dealer floors, already have arrived in this country.

The station wagon carries the following port-of-entry list prices: New York City (East and Gulf Coasts), $2194.45; Detroit (Great Lakes), $2263.31; and San Francisco (West Coast), $2376.59. Prices include heater and defroster, electric windshield wiper, turn signals, laminated glass, and oil bath air cleaner as standard equipment.

Destination, delivery and handling charges, Federal, state and local taxes are not included.

Through May, Pontiac brought 10,000 Vauxhall sedans into this country, of which 6550 were sold. Since first shipments last September, both the import and sales rate have increased steadily. In January 735 were sold, in February 810, in March 1083, in April 1293, and in May about 1500.

Goodrich Scientists Develop A More "Rubbery" Synthetic

A new man-made rubber described as more "rubbery" than the natural product has been produced for use as a research tool.

The new material, known as deuterio rubber, was announced in Cologne, Germany, recently by Dr. Waldo L. Simon, director of polymer research for B. F. Goodrich Co.

Dr. Semon explained that in deuterio rubber heavy hydrogen atoms from heavy water replace the conventional hydrogen atoms attached to the carbon chains in the molecules of ordinary rubbers. Because molecules containing deuterium atoms have less attraction for each other than those containing hydrogen atoms, a more fluid, elastic rubber results.

Deuterio rubber's high cost restricts its use to that of a research tool to help scientists learn more about conventional rubbers, Dr. Semon said.

The material was synthesized at the B. F. Goodrich Center by a team headed by Dr. David Craig. Its preparation was sponsored by Goodrich-Gulf Chemicals, Inc.

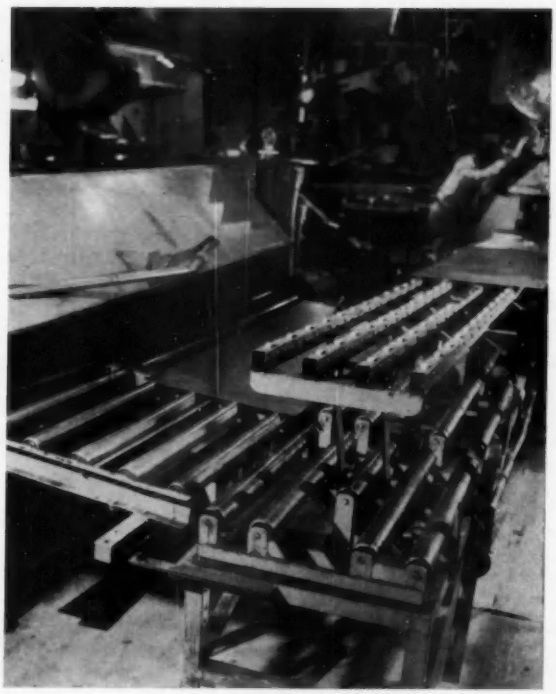
Chrysler Corp. Opens First Regional Training Center

Chrysler Corp. has opened the first of eight regional training centers for dealer personnel at Atlanta, Ga. The 55,000 sq ft center is equipped to train 6000 sales and service personnel annually, drawing from 2000 dealers with 25,000 employes in 10 southern states.

Service training rooms for engine, body and chassis classes are equipped with dynamometers, hoists, and other special equipment. Sales training rooms and a 375-seat auditorium are included.

TRANSFER CO

Westinghouse Electric Corp. engineers solved the problem of moving sheet steel from the shear at the left to the press brake at the right by means of the elevator transfer conveyor shown here. The sheared sheet is conveyed by gravity over the cylindrical rolls to a position above the transfer conveyor; when the sheet hits the stop bars, a microswitch is tripped and an air cylinder elevates the conveyor to the "up" position; gravity moves the sheet into position for the press brake operator. A mechanical stop holds the second sheet (as shown in photo) until the conveyor is returned to "down," and an electrical interlock holds the conveyor in "down" until the first sheet is used.



PLYMOUTH—one of the leading engine manufacturers using Perfect Circle piston rings for original equipment.

Behind the world-wide preference for Perfect Circle piston rings is a history of more than half a century of PC engineering leadership—and more. There's a history, too, of unceasing creative research...a constant search for the new and the better...matchless manufacturing skills...and scores of contributions to the forward march of the automotive industry, year after year. Whenever you have a problem concerning piston rings or related engine components, you are invited to call upon our engineering and research facilities. Perfect Circle Corporation, Hagerstown, Indiana; The Perfect Circle Co., Ltd., 888 Don Mills Road, Don Mills, Ontario.

PERFECT CIRCLE PISTON RINGS

METALS

With Gains in Orders and End of Inventory Reduction In Sight, Steel Industry Feels Trend Is Now Upward

By William F. Boericke

Steel Industry Sees Upswing Ahead

The steel industry is more cheerful. Belief is gaining ground that the bottom of the recession was reached in April, and that the trend is now upward. There is no untempered optimism that the upsurge will be anything but moderate, but the signs are definite that the improvement is more than seasonal.

By mid-May the third straight weekly gain was made in steel output. From the low point of 47 per cent of operating capacity in April, the rate had climbed to 52 per cent. May could show an output of 5.9 million tons. Incoming orders have increased, and they do not appear to have been influenced to any substantial extent by the likelihood of a price increase in July following the hike in wages then contracted for. General belief is that base prices will be advanced $4-6 per ton, or about half the cost of the wage increase and supplementary benefits.

Inventory Reduction Nearing End

A more realistic explanation is that the long period of inventory reduction is approaching its end, give or take a few months. At the present time the inventory situation appears to parallel 1954, when quite suddenly there was a switch from reduction to accumulation of steel. Any substantial pick-up in orders would be reflected quickly in a lengthening of delivery schedules, and buyers wanting to place rush orders would speedily find they could not get such service. This could lead to some quick decisions to replenish inventories in a hurry.

This view is confirmed by expressions from the National Association of Purchasing Agents, who declared they were presently buying less steel than they were consuming and said they would be buying steel for prompt delivery by the end of the second quarter, with most of inventory liquidation completed. It does not seem over-hopeful to believe the operating rate will be crowding 60 per cent of steel capacity within a couple of months.

Improved Demand for Structural Steel

While steel demand from the Detroit area remains distressingly low, there are improved orders for structural shapes for the construction industry. If the railroads get the help that now seems assured from Congress, it could result in some heavy orders from that hard-hit industry, which has been out of the market for a long time. Oil country goods, drill pipe and casing are still in the doldrums and may remain so until a final decision is forthcoming on the controversial Memphis case.

Alloy and stainless steel output is scarcely half that of a year ago. Severe competition from foreign steel mills is being encountered on such line as wire products and pipe, particularly in the Atlantic and Pacific coast cities.

Copper Situation Confused

Trade reports are conflicting on domestic business in copper. April sales in this country were fairly good for the custom smelters, following the advance in their price to 23¾ cents a pound. On the other hand, the primary producers reported only a slack demand at their 25-cent level. Scrap prices advanced, with supplies scarce.

In London, copper has steadied around 22¼ cents but appear unable to break the £180 barrier (22½ cents a pound). Wire bars continue to sell at 1½ cent premium on the Continent. This strength appears to reflect the loss of some 27,000 tons of Chilean copper resulting from the work stoppage at Chuquicamata.

It is pointed out in trade circles that the big producers are not alarmed over losing some business to the custom smelters if it results in moving some of the large stocks of metal held by them from the market. If this occurs, it would give a stronger basis for their 25-cent price and permit a rise if demand improved further.

Abroad, copper consumption continues at a satisfactory rate. The Japanese are reported to have successfully reduced unsold refined inventories and are projecting an increase in output. If the premium on wirebars is considered, there is not much difference between the price level in Europe and the custom smelter's price in this country, hence exports of copper to the United States show a minimum of profit.

Undoubtedly the copper and brass fabricators have been harder hit than the copper producers, by European competition. This was made abundantly evident by the announcement by Revere Copper & Brass of a 10 per cent reduction in copper water tube prices. It was stated that the foreign tube was selling as much as 25 per cent below the American product. The price reduction was quickly followed by other domestic fabricators.

(*Continued on page* 98)

Better Tools...

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What's new in the way of garden tools? This tool caddy, for one thing, and Sharon metallurgists know all about it.

Sharon has been supplying carbon, stainless and special alloy steels to garden and farm implement manufacturers for more than 50 years and they know the industry and its requirements.

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SHARONSTEEL

SHARON STEEL CORP.

SHARON, PENNSYLVANIA

METALS

(*Continued from page* 96)

Missile Program Important for Aluminum

Certain consumer outlets for aluminum, such as foil, are doing well, but obviously this is no tonnage market. A pickup in demand from the transportation and building industries is prayed for. But the producers look hopefully at the missile program as an increasingly important market, particularly the small missiles designed to take the place of artillery fire by both surface and air forces. While these latter will take only two pounds of aluminum per unit, there will be a need for millions of them. The larger missiles, like the Navy's Vanguard, require about 3700 lb out of a total weight of 22,600 lb.

Seaton Plan for Lead, Zinc and Copper

By-passing the program for higher tariffs and quotas that appeared all but assured since the first of the year, the Administration came out last month with a new support plan for the hard-hit producers of copper, lead, and zinc, as well as tungsten and fluorspar. Proposed by Interior Secretary Seaton, it calls for stabilization payments on these metals in order to provide relief. The program, recommended to extend over a five-year period, is estimated to cost the Government about $161 million the first year. The annual cost in subsquent years should diminish as production responds to demand.

In brief, the stabilization payments would call for a price of 27½ cents a pound for copper, with annual limit of 1 million tons; 14¾ cents for lead, limit 350,000 tons; and 12¾ cents for zinc, with 550,000 tons limit. These limits approximate present domestic production of each. The payment in each instance would be computed on the difference between the domestic price and the stabilization price. Adequate safeguards would be set up to insure equitable distributions of stabilization payments, so that all producers, large and small, could participate. The support prices, of course, would apply only to domestic new mine production, and not to refinery operations.

The Seaton plan would take the place of the recommendations of the Tariff Commission, which were finally released just prior to the Seaton proposal. In a split decision, it was recommended by one group that duties be raised on lead to 2⅛ cents a pound and 1¾ cents on zinc; and by the other, to 2.56 cents on lead and 2.1 cents on zinc.

Plan Opposed By Metal Producers

Reception of the Seaton plan by the trade was considerably less than enthusiastic, and ran into spirited opposition immediately. Various Congressional leaders asserted the support limits would be insufficient to prevent continued heavy imports of metal. Executives in the mining industry condemned the plan on many grounds. They object to a program that depended on Congress appropriating yearly the money to carry it out. They see many practical objections to implementing it successfully. Some think that the net result could be price-cutting by domestic mines and an end to voluntary production control, as the mines would figure they would get the price difference back from the Government in any event. While domestic mines would gain some temporary benefit, it would not prove to be any permanent remedy for their troubles.

In a nutshell, the mining industry declares it has had its fill of subsidies in the past and wants no more of them. The Anaconda chairman declared the plan really helps the low cost mines rather than the high cost. Many officials agreed that the Seaton plan could push prices down further and so create more dissatisfaction, both here and abroad.

The domestic brass and copper mills have voiced oppositionas well. A spokesman declares the plan offers no relief whatever for his industry, hurt more than the copper producers by imports. A protest by the president of Reynolds Metals emphasizes that the plan discriminates against the aluminum industry by favoring copper, lead, and zinc producers in providing a Government subsidy to these competitors of aluminum, and that the aluminum industry would consequently find itself competing against unduly low prices for these metals made possible by the proposed subsidies.

Zinc and Lead Demand Dormant

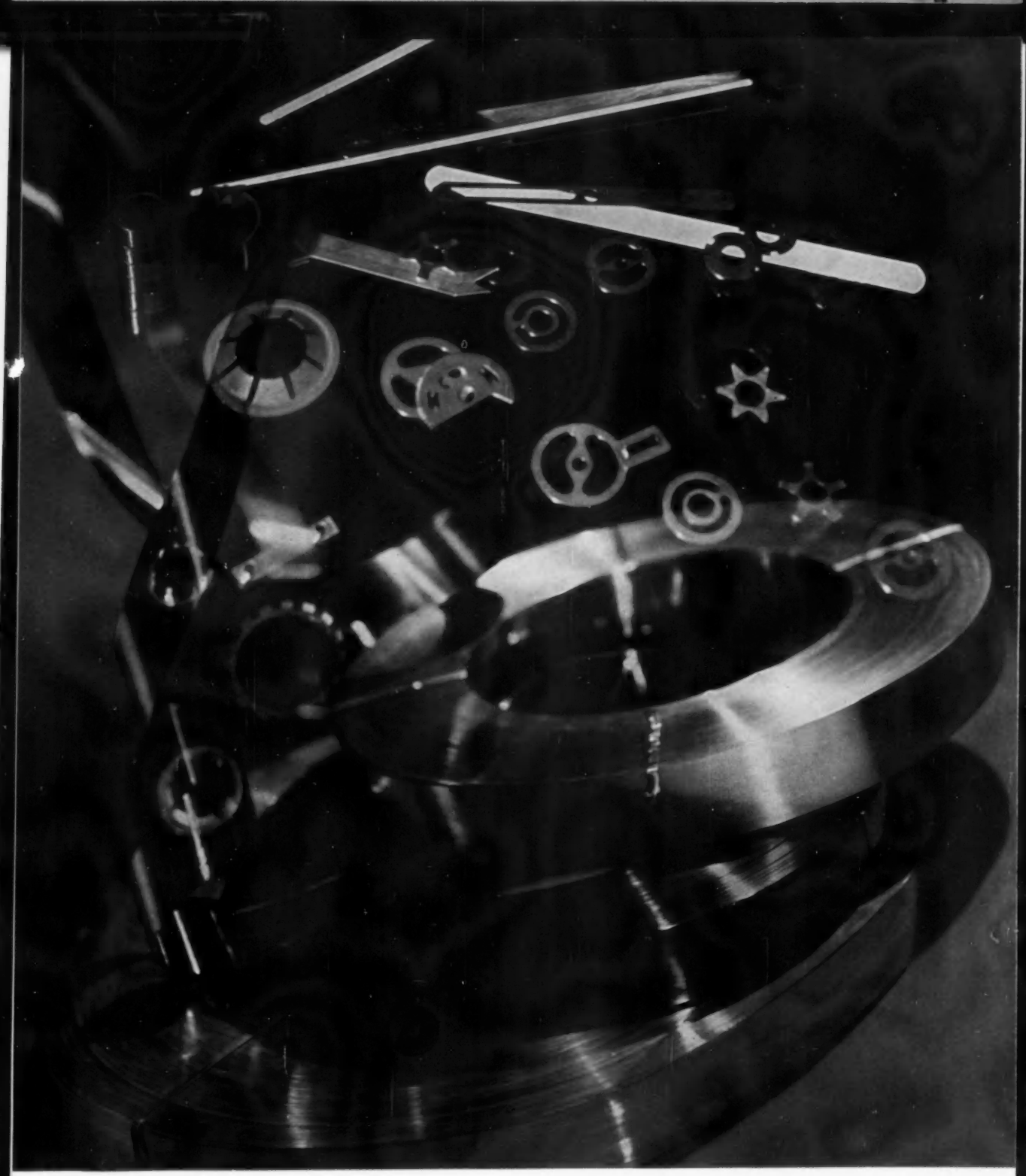
Zinc and lead markets through mid-May were featureless. Early in the month the sales volume of lead declined to the lowest level for years and foreign metal was reported to be offered under the domestic 12-cent price by as much as one cent a pound for two months ahead. As a result the already heavy unsold stocks in the hands of producers and custom smelters are being increased. It is more than likely that the price would again be reduced if it were not for the firm belief that relief of some sort, either through the Seaton plan or by higher tariffs, will not be long-delayed.

Zinc demand is little better than for lead. Foreign metal is being imported at prices below the domestic market. Some slight improvement has been witnessed in call from the galvanizers, but hardly more than seasonal. Meanwhile the zinc industry had to digest another poor statistical picture in the April figures. Stocks of the metal rose over 17,500 tons to pass 221,000 tons, the highest in 12 years, while shipments were down 5100 tons. Production of slab declined, but failed as yet to reflect the cutbacks announced by producers except to a small degree.

Quotas Opposed By Smelters

Unfortunately there is no unanimity in the zinc and lead industry as to the merit of import quotas as a relief measure. A major smelter

(*Turn to page* 101, *please*)



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You pay for mechanical and dimensional uniformity when you buy flat spring steel...you *get* it when you buy Roebling.

For information on how our products can help *yours*, write Wire and Cold Rolled Steel Products Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

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A TOWN WHERE "NOTHING EVER HAPPENS"...

A home town—like your town. A place where people said "it couldn't happen to us."

But it *did*. Like a whip, a great tornado lashed down Maple Street, splintering houses, leaving people hurt—homeless—panic-stricken.

A desperate call went out for the Red Cross and quickly, automatically, the team went into action.

Red Cross nurses slipped into uniform . . . volunteers set up first aid stations . . . canteens fed the hungry. Later, Red Cross money and work helped rebuild the town.

Last year was one of the worst disaster years of this century, and the year before, 1956, was almost as bad. Every month and in every state, the Red Cross strained to the limit as hurricanes, floods, tornadoes, forest fires swept across the country.

Red Cross receives no government funds—depends entirely upon *you* for support. Give as much as you can. Your dollars may go to your own town when it needs them most.

Join and Serve

SPACE CONTRIBUTED BY AUTOMOTIVE INDUSTRIES

METALS

(*Continued from page* 98)

foresees a shut-down of processing plants if quotas were imposed, and consequent increase in unemployment. On the other hand, quotas are hailed by some producers as the answer to curbing the present heavy imports of lead and zinc that are playing havoc with metal prices; and they have been recommended by the Republican members of the Tariff Commission.

A major research program is to be launched by the lead and zinc trade associations here and obroad to increase worldwide consumption of both metals. It has been agreed by the sponsoring companies that funds will be provided for any project that secures approval of the respective committees. New markets are badly needed. In the first quarter of the year, zinc consumption fell 25 per cent below the similar 1957 period, while lead consumption fell off 20 per cent.

Aluminum Producers Cut Back Output

The two cents per pound reduction in the aluminum price has not as yet promoted any substantial increased demand for the metal, although some little improvement in orders is noted. Producers have cut back their output to keep production in line with the foreseeable requirements immediately ahead. There is general acceptance of the belief that the annual 8-10 per cent increase in consumer requirements, so confidently counted on heretofore, has come to a temporary halt. Second quarter operations have been scaled down to 360,000 tons from an original target of 420,000 tons.

In consequence, Aluminum Co. has reduced its production to 70 per cent of capacity, Kaiser to 70-75 per cent, and Anaconda to 75 per cent. Reynolds Metals was the last to fall in line, after reaching a new high peak of 563,500 tons a year. The total cutbacks are believed to have reduced output of primary metal to about 84 per cent of capacity for the first quarter. Nevertheless, because of the addition of new production facilities, the first quarter output of this year was slightly ahead of the comparable period of 1957.

Stockpile Requirements Reduced

No doubt the revision of supply contracts for the Government stockpile has resulted in making substantial additional tonnages of metal available for domestic users. It appears likely there may be no need for an enlarged aluminum stockpile in the future because of the steady increase in production facilities, as well as the change in national policy for defense needs following the new concept of modern warfare. Originally a five-year supply of aluminum for the stockpile was believed necessary. The Office of Defense Mobilization has now reduced it to three years. But there is no thought in Washington of disposing of surplus aluminum in the foreseeable future; and the Government is still contingently liable, under put contracts entered into with the producers, to buy over 757,000 tons before these puts expire.

Aluminum warehouse business, always intensely competitive, has been further hurt by imports of many end products from Great Britain and Japan, offered at prices as much as 10 cents a pound below the American market. Severe inventory losses were taken as well, following the price cut in primary metal.

It is anyone's guess what will happen to the price structure when the new wage contract goes into effect in August. It appears doubtful at this time if the increased costs, estimated about $50 million, can be passed on to consumers unless business shows a startling improvement.

AUTOMOTIVE INDUSTRIES
KEEPS YOU INFORMED

Report from the FARM EQUIPMENT INDUSTRY

(*Continued from page* 57)

the sheller. From the shelling cylinder, kernels and stalks move into an unusually large separating and cleaning area. Cornstalks and cobs are thoroughly shredded and may be spread as mulch.

Addition of the corn header to the combine makes the unit an all-purpose harvesting machine. Grain and corn headers are easily interchangeable.

New Crop Dryer

The John Deere 458 crop dryer, just announced, marks the entry of Deere & Co. in the dryer field. It is a portable, batch-type blending dryer in the 400-bushel class, designed to remove excess moisture from shelled corn and other grain.

This unit is LP-gas fired, and PTO-driven by a John Deere 520 or other tractor of three-plow power or more. The tractor battery powers its electric ignition and fuel controls. Basically, the 458 dryer consists of two perforated chambers, one inside the other. Grain is held between them, in a tubular layer about 18 in thick. The burner and fan in the inside chamber provide heated air which blows outward through the perforated walls and the layer of grain.

The dryer has a drawbar and retractable wheels for transporting. It also has a folding auger hopper for loading grain from trucks or wagons, and a discharge spout for unloading.

Farm Income

The index of prices received by farmers, as compiled by the Department of Agriculture, stood at 266 for the month ending April 15, 1958. This compares with 263 for the preceding month, and with 242 for April, 1957. Farmers' cash receipts for March, 1958, were $2.1 billion.

Observations

By Joseph Geschelin

Digital Control

A session on Numerical Control of machine tools at the recent SAE National Production Meeting emphasized that such equipment—currently in use by the aircraft manufacturers—is especially indicated for complex milling, turning, and drilling operations. The mechanism is sound and will repeat unfailingly. Moreover, there is no limitation on feed rates. As more experience is gained, the machine tool builders are convinced that further improvements in accuracy will be available. Moreover, improvements in the basic machine tools—in increased power, and greater rigidity — will make numerical control even more effective. One interesting question that came up was the practicability of employing numerically-controlled machines in mass production in an automotive plant. One of the specialists estimated that where complicated machining is required, numerical control should be economically feasible in competition with a transfer machine up to a break-even point of say, up to 15,000 parts a year.

Hydro Spin

One of the companies in our midst has been operating a Cincinnati Hydro-Spin machine for several years and has gained important know-how thereby. They are handling large parts such as are required for missiles and rockets. One of the latest ventures is an experimental project to study the art of hot spinning. This appears to be the answer to the forming of parts having an extremely intricate contour. They also believe it will be practical to spin concentric shells of dissimilar materials to provide the benefit of bimetallic structure. Thus they could spin a shell of say nickel or moly or titanium into a thin-walled contour, then over it spin a shell of mild steel. They can also take a large intricate forging or centrifugal casting and spin a long tubular member from excess material to produce a large extension at low cost.

Ceramic Tooling

Although applications of ceramic tools have been impressive and sometimes dramatic, their introduction in regular production has been quite conservative. It takes time to select the right applications where the change from carbides can be made to pay off. Meanwhile, the producers of ceramic tools have been busy on research and development. There have been problems of reproducibility and of physical properties. But this work has paid off. Just recently ceramic materials have been made available with high physical properties—transverse rupture of the order of over 100,000 psi being one example. Meanwhile, the producers of carbides have not been asleep. We were shown some test results recently with new carbide grades, indicating that some of the newer formulations can surpass ceramics by a comfortable margin. Phenomenal results have attended some experimental runs with cermets produced by the vacuum melting process. This rivalry among primary tool producers is bound to lift metal cutting to levels undreamed of a few years ago.

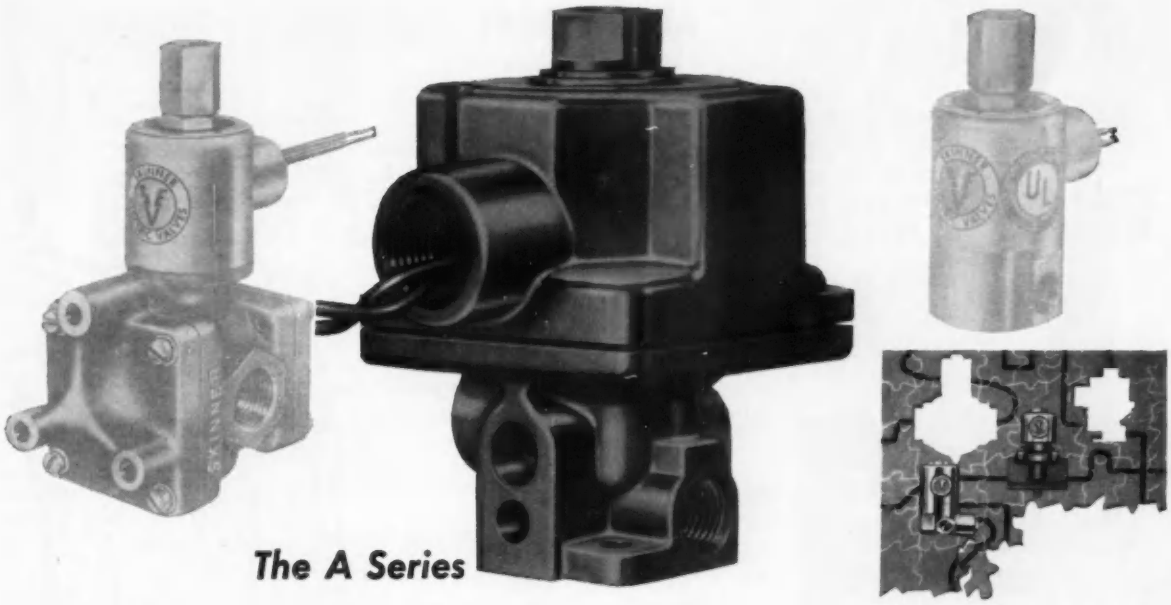
Radical Engine

Recently we were told about a really unorthodox engine design. It is a rotary internal combustion engine with cylinders contained within vanes which are attached to the drive shaft. When combustion takes place within one of the vane chambers its effect is to produce rotation. Although patents have been applied for, we did not see a disclosure of the mechanism. Nevertheless, its proponents claim it is a practical machine with high thermal efficiency and extremely high torque characteristics.

U. S. foreign aid in the new fiscal year is likely to be considerably below what the Eisenhower Administration is asking. Ike wants about $3.9 billion, but it looks as though Congress will approve only about $3.5 billion—down nearly half a billion from what the State Dept. says is "essential."

Fact is, Congress is taking the attitude that what State Dept. says is essential isn't necessarily so. Documented reports of waste in the foreign aid program are turning up all over the globe, and it's becoming more and more apparent that many State Dept. officials have become more preoccupied with keeping their plush jobs and Government limousines than they are with putting up a militant fight against Communism.

Politicians battle over why more small firms aren't awarded prime contracts to build missiles and rockets. Pentagon planners claim most small firms aren't capable; that 2 per cent of prime contract awards is a "fair share."



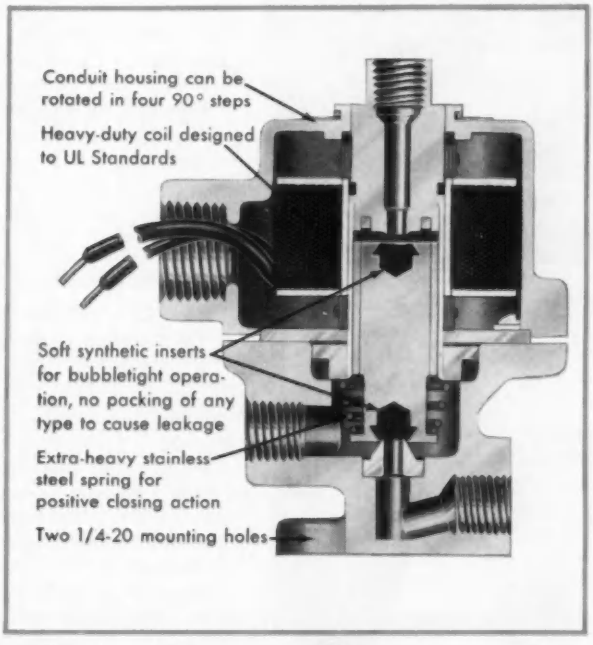
NEW— three-way Skinner Valve line for medium-size cylinders

This new A Series valve line bridges the gap between the famous V5 line used with small cylinders and the reliable M3 line used with large cylinders. The design of this new line permits economical and efficient operation of medium-size cylinders as well as faster operation of smaller cylinders where increased cycling speed is a necessity.

The first of the A Series line is a 3-way normally closed valve with a $^{5}/_{32}$" orifice and $^{1}/_{4}$" NPT ports, and a pressure rating of 125 PSI. It is designed for use with such media as oil, air and inert gases.

Despite the increase in capacity, this new valve is light in weight (only 3 pounds) and compact ($3^{7}/_{8}$" high and $2^{5}/_{8}$" square). The body and mounting are non-corrosive zinc and the internal parts are stainless steel. The plunger is spring-loaded and direct-acting, and the valve can be mounted in any position. Soft synthetic inserts are used, assuring bubbletight operation and long, trouble-free life.

For additional information, options and specifications, call the Skinner Representative or Distributor nearest you – he's listed in the Yellow Pages. Or write us at the address below, Dept. 336.


Conduit housing can be rotated in four 90° steps
Heavy-duty coil designed to UL Standards
Soft synthetic inserts for bubbletight operation, no packing of any type to cause leakage
Extra-heavy stainless steel spring for positive closing action
Two 1/4-20 mounting holes

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See Your Capewell Distributor

CAPEWELL

THE CAPEWELL MFG. CO.
HARTFORD 2, CONN.

AUTOMATION
News Report

(*Continued from page* 72)

era is located behind an opening in the dial panel (which separates the box into two parts) and it photographs the dials by way of a mirror on the inside of the facing endwall.

The camera has been modified to include an electrical drive, which does away with manual winding and allows automatic remote control for both continuous and single-frame operation.

SPECTROMETER AWARD

Consolidated Electrodynamics Corp. has been awarded a $99,000 Air Force research and development contract for a mass spectrometer instrumentation system to be used in materials research and analysis.

The contract calls for a system that will detect impurities in metals, ceramics, and other critical materials used in missile and aircraft structures. The system will also be capable of analyzing plastics, lubricants, and gases.

The work will be carried out at CEC's Central Research Div. in cooperation with the Materials Physics Branch of Wright Air Development Center's Materials Laboratory.

• • •

New Law Permits Free Entry Of Foreign Cars and Parts

Free entry of foreign cars and automotive parts into the U. S. for show purposes is permitted under a newly-enacted law.

Public Law 379, 85th Congress, provides for importation of the foreign products without payment of import duties. The cars and parts may be brought in solely for display and must be exported within six months after entry. Duty-free privileges extended to those nations that will grant temporary free entry to U. S. products.

This last provision draws a protest from President Eisenhower. Congress, he suggests, should do away with the requirement that reciprocal entry privileges apply to U. S. goods. The conditional terms are not in accord with the nation's "obligation" as to import duty practices, he says.

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ASME Conference Program

(*Continued from page* 74)

Development and Research in Materials Handling Equipment

O. S. Carliss, Director of Engineering, Materials Handling Division, Yale & Towne Manufacturing Company, Philadelphia, Penna.

Development of Nuclear Handling Equipment

W. J. Dollart, Applications Engineer, Atomic Power Department, Westinghouse Electric Corp., East Pittsburgh, Penna.

THURSDAY, JUNE 12

TECHNICAL SESSION IV

Materials Handling in Atomic and Space Age

Chairman: Eric Berghaust, Executive Editor, Missiles and Rockets, Washington, D. C.

Handling Problems with Radioactive Materials

Frank Ring, Jr., Superintendent of Design, Oak Ridge National Laboratory, Oak Ridge, Tenn.

Materials Handling Equipment in Missile Launching

Lt. Col. Charles M. Parkin, U.S.A., Corps of Engineers, Fort Belvoir, Va.

Materials Handling in Logistics for Missiles

Michael L. Mastracci, Project Engineer, Mechanical Laboratories, American Machine and Foundry Company, Greenwich, Conn.

Efficient Parts Handling in Outboard Motor Plant

(*Continued from page* 68)

The carton containing the complete assembly then moves on a powered roller conveyor to a short elevator conveyor that lifts it several feet to the start of another line roller conveyor. The engine in its shipping carton moves out to storage on this conveyor, its travel controlled from a console unit which operates diverters along the line of travel of the conveyor. A total of 30 lengths of roller track stretch out at right angles to the conveyor on which the packaged engines travel, and the operator at the console control unit can, by pressing a button, divert the carton onto any predetermined length of storage track. In this way all of the 12 models assembled on the line can be run onto storage roller track, keeping the models separate from each other, and held for shipping, without any manual handling of the cartons. The 30 storage conveyors have a capacity of 800 cartons.

Taking the packaged motors out of storage for shipping is done by one man, sitting at a console control unit that duplicates the unit on the to-storage side. Another roller conveyor extends along the side of the storage tracks opposite the inbound conveyor, and the shipping clerk at the console controls can release a carton from any one of the storage tracks onto this outbound conveyor. This gives first-in-first-out handling of motors in storage. With his shipping instructions before him, the shipping clerk releases the required number of each type of motor from stock, and as the cartons move past his desk on the outbound roller conveyor, he slaps a shipping tag onto each carton. The cartons continue on to the truck loading docks or rail shipping platforms.

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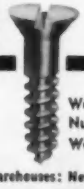
SOUTHERN'S completely redesigned 9" x 9" x 6½" telescopic type bulk container (proven in actual year-long tests) is constructed of sturdy 275# test heavy duty board. Standard pallet quantities consist of 36-cartons, 4 layers of 9 cartons to each 30" x 30" disposable 2-way entry pallet. Whether handled manually, or by mechanical or power equipment, Southern's new bulk packing system has multiple advantages that can be prime cost-reduction factors for you: EASIER to STORE, to open and close, to use, to identify, to inventory . . . plus many others!

Standard packing quantities have been established for Southern's new pallet and carton system. Write for Chart BP-1, to Southern Screw Company, Box 1360, Statesville, N. C.



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And . . . *foundry engineered UNITCASTINGS*, produced by superior methods, assure steel castings that are internally sound . . . surfaces that are clean and dimensionally accurate . . . and require minimum finishing. Lower *finished* cost is the *real* advantage of specifying UNITCASTINGS. Write for complete information today!

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Unitcast

SPECIFICATION STEEL CASTINGS

Ford Rawsonville Plant

(*Continued from page* 56)

secondary operations. For example, the inner and outer rotors for the pump require surface grinding on both sides. This is done in double-end grinders. In addition, each part must be deburred. Deburring is done in automatic cycle machines. Here each piece is loaded individually onto one of 14 spindles of the machine, deburring being accomplished by having the spindles move through a bed of selected stones.

Pump gears, of spur tooth type, are required in a selection of three different thicknesses. Thickness is held to size in sizing presses, then the OD is finished to required tolerances by grinding in centerless grinders. Final operation is deburring.

This department also produces three different crankshaft sprockets and these require considerably more processing. Finish-grinding of the bore and facing are handled in the same setting in internal grinders.

Because of the duty to which these sprockets are subjected they also require hardening, this being done in a special heat treating furnace. And following this the sprockets take a sizing operation. Unique feature of this operation is the special automation. The problem here is that the gear is not symmetrical and must be presented to the die in the press with a specific face down and with the keyway in an exact location.

The gears are loaded at random into the spiral channel of the feeder, moving the parts from the bottom to the top level. As the gears come off the top and enter the automation feed, the channel senses the position of the gear by menas of the chamfer on one side. If the gear is properly aligned it slides down the chute to the press. If it is not in proper position the mechanism trips a slide in the chute, thus flipping the gear over. In the process this gear drops through a trap door onto a lower chute and then progresses into the common feeder chute.

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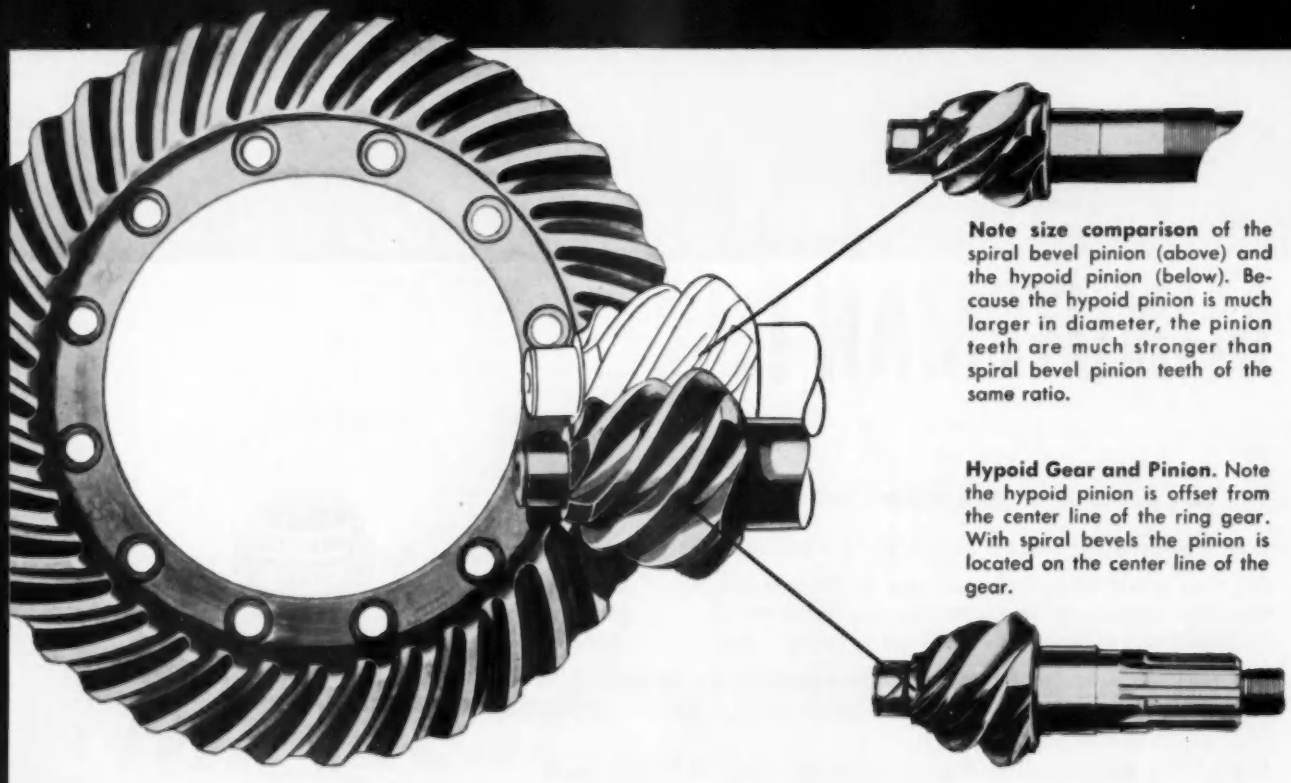
Hypoid Gears 30% More Torque Than Spiral Bevels!



Note size comparison of the spiral bevel pinion (above) and the hypoid pinion (below). Because the hypoid pinion is much larger in diameter, the pinion teeth are much stronger than spiral bevel pinion teeth of the same ratio.

Hypoid Gear and Pinion. Note the hypoid pinion is offset from the center line of the ring gear. With spiral bevels the pinion is located on the center line of the gear.

Products of ROCKWELL-

Have Capacity

Timken-Detroit pioneered and developed hypoid gears for trucks of every type and capacity... and today is the acknowledged leader in the field!

A FEW OF THE MANY LEADERS WHO USE TIMKEN-DETROIT AXLES WITH HYPOID GEARS
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RED STAR FOR Dependability
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CONVERSE TRUCKING SERVICE
INTERSTATE MOTOR FREIGHT SYSTEM
Indianhead TRUCK LINE, INC.
Johnson Motor Lines, Inc.
MUSHROOM
SPECTOR MID-STATES

The trend of the trucking industry today is to hypoid gears, because their torque capacity is 30% greater than that of spiral bevel sets of the same ring gear diameter and ratio! The result is lower maintenance costs, greater dependability, and lower-cost operation. And, since hypoid gears do every driving axle job better . . . from the smallest single reduction axles to the largest double reductions . . . more and more operators specify them every day.

Hypoid gearing is another plus feature found in all Timken-Detroit Letter Series Single and Tandem Driving Axles!

Plants at: Detroit, Michigan
Oshkosh, Wisconsin • Kenton and Newark, Ohio
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ROCKWELL-STANDARD CORPORATION
TRANSMISSION AND AXLE DIVISION
DETROIT 32, MICHIGAN
The Accepted DA Standard
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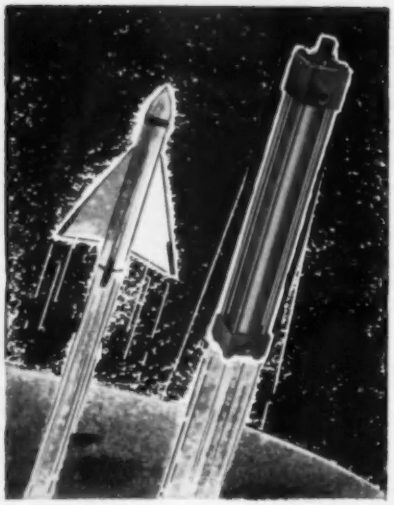
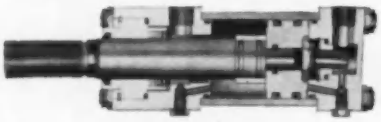


ORTMAN-MILLER Launches Another Star Performer The O-M Automation

Heavy-Duty Air and Hydraulic Cylinders
1000 PSI Hydraulic — Series RH
200 PSI Air — Series RA
available in 1½" to 8" bores

Meets JIC and Automotive Industry "Automation Standards"



Any resemblance between a guided missile and an O-M AUTOMATION cylinder is purely coincidental. However, each stands as a symbol of progress in its own field.

In the Series RA and RH air and hydraulic cylinders O-M has incorporated many advanced features in an extremely rugged line of cylinders designed to meet automotive industry specifications for Automation cylinders. The advanced design of these cylinders makes them well suited for severe applications in all types of machinery and equipment.

For detailed information, consult your local O-M representative or see our new catalogues No. 107 for Air Cylinders—No. 108 for Hydraulic Cylinders.

Mail coupon below for your copy!

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Name_____ Position_____
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SHORTIES

Factory-installed automobile air conditioning units have been gaining at the rate of one per cent of total production each year for the past three years. In 1955 only 118,267 units—or 1.7 per cent of all production—were equipped with this option; in 1956, the figure was raised to 171,595 (2.7 per cent); and in 1957, it hit 288,007 units, or 3.7 per cent.

•

A single section of a jet transport fuselage requires 10,000 production tools.

•

Cash dividends by corporations issuing public reports totaled $11.5 billion in 1957, compared with $11.3 billion in 1956.

The number of motor trucks operating in the U. S. has increased 60 per cent in the past ten years—from 6,800,000 in 1947 to 10,900,000 today.

•

U. S. motor vehicle and parts manufacturers spent an estimated $1.3 billion on new plants and equipment in 1957. Since World War II, the industry spent a total of $11 billion on expansion and modernization.

•

With less than six per cent of the world's area and slightly more than six per cent of the world's population, the U. S. has almost 70 per cent of the world's passenger cars and 45.5 per cent of the world's trucks.

•

Automobile and truck manufacturers consume more than one-fifth of the nation's total steel production, and nearly half the sheet steel.

•

Taxes take about a quarter of each dollar spent on automobiles in the U. S.

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ESTABLISHED 1914

HYPALON® coating adds utility and good looks to new roof-rail seal

Four-door hardtop models of a leading manufacturer are now using an improved roof-rail seal molded of rubber latex coated with Du Pont HYPALON synthetic rubber. The new seal is designed to keep windows permanently weathertight while blending naturally into the car's over-all design.

HYPALON plays an important part in both the efficiency and appearance of this roof-rail seal. The rubber latex core provides excellent low sealing pressure, but alone absorbs water and is vulnerable to rapid aging and deterioration. The HYPALON coating keeps the rubber seal free from weather and moisture – insures its waterproof seal for many years.

In addition, the HYPALON coating itself stays fresh and new looking. It resists constant abrasion, won't crack or flake off because of temperature extremes or ozone. And, if desired, HYPALON can be compounded in a wide range of colors that are unusually stable to light and weather.

Du Pont HYPALON is a widely accepted coating material for all types of automotive seals that are exposed to weather and abrasion. Its combination of properties has been found similarly useful in such applications as ignition cable jackets, molded spark plug boots, interior fabric coatings and many other products. For helpful ideas, send coupon now for publications highlighting new design applications of HYPALON . . . and neoprene, the synthetic rubber made by Du Pont for 26 years.

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WHY Pratt & Whitney MICROHONES Bores In Titanium Spacers

Rotor disc spacers, that are used in jet engines, require accurate bores having consistent surface finish. Thus, the final processing method must generate bores with diametric and geometric accuracies within .0005″ and consistent finishes of 15 microinches.

But, Pratt & Whitney Aircraft Division, U.A.C., faced additional problems in selecting the final processing method for these .110″ length bores in titanium spacers. Because the spacers are manufactured in 20 different heights and bores in two diameters, efficient production demanded extreme versatility of the processing method used.

Here's why Pratt & Whitney chose the Microhoning process and equipment to economically produce the required results: Microhoning, in removing .004″ of stock from each bore, accurately holds to size and finish requirements; and because the fixturing positions all 20 spacer heights at same work level, the tool stroke never needs adjustment. The Microhoning of all 16 bores in each titanium spacer is completed in about 7 minutes (including loading and unloading time).

Learn why Microhoning will give efficient stock removal, closer tolerances, accurate alignment and functional surfaces.

☐ Please have a Micromatic Field Engineer call.
☐ Please send Micromatic literature and case histories.

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MACHINERY NEWS

(*Continued from page* 80)

to wait 15 to 25 years to get their investment back. Significantly, the present capital goods recession followed almost immediately upon the heels of the 1957 Byrd Amendment, which virtually eliminated five-year write-offs of capital expenditures for tax purposes and relegated taxpayers to the outmoded Bulletin F concept of depreciable lives."

Speaking on behalf of NMTBA, Mr. Bodine urged the adoption of two proposals to stimulate immediate industrial activity:

First, as a short-term anti-recession measure, five-year amortization should be made available to all purchasers of machine tools and other durable productive equipment purchased between January 1, 1958 and June 30, 1959.

Second, as a permanent measure, the outmoded useful lives for depreciable assets embodied in Bulletin F, the antiquated Bulletin F system of deciding useful lives on an asset-by-asset basis, and the unfair burden of proof placed on the taxpayer should all be scrapped. In their place, the Treasury should adopt the "bracket approach" previously recommended by the Association.

Under the "bracket approach," depreciable assets would be divided into a limited number (10 or 15) of broad classifications. A bracket of reasonable useful lives providing a maximum and a minimum life would be established for each class. If a taxpayer chose a depreciable life within the bracket his decision would not be challenged by the Internal Revenue Service. If the taxpayer wished to go beyond the bracket he would have the burden of proof.

The lives selected for the bracket "should be much shorter and more realistic than those in Bulletin F." For example, the Association has recommended a range of 7 to 10 years for machine tools—in lieu of the 15, 20 and 25-year lives for individual machine tools listed in Bulletin F.

New Four-Axis Keller Delivered to Aircraft Builder

Pratt & Whitney Co., Inc. has developed and built a new type Keller automatic tracer-controlled milling machine with a special milling head that can be tilted 20 deg above or below the horizontal position. The initial unit has been delivered to North American Aviation, Inc. for installation at its Columbus, Ohio plant, the company said.

The machine was designed especially for profile milling of "warped" surfaces of aircraft components which must be accurately profiled to conform with the contours of the aircraft's outer surface. This is accomplished by utilizing the tilting motion of the special cutting head. A template, mounted parallel to the horizontal motion of the machine so as to present a rise-and-fall motion to a roll follower, controls the angle of tilt through servo action. The new Keller, weighing more than 75 tons, is the first four-axis milling machine built by Pratt & Whitney.

Another feature of the tilt-head Keller is the location of the operator's control panel. It is on an electrically-powered elevator which can be raised or lowered to afford operator view of the work regardless of the position of the milling cutter.

Around the Industry

Fosdick Machine Tool Co.—Frank J. Fields has been appointed president. Before joining Fosdick in the fall of 1957 as works manager, Mr. Fields had been executive vice-president and general manager of the Sidney Machine Tool Co.

Giddings & Lewis Machine Tool Co.—Edgar L. McFerren has been named vice-president-sales, and George K. Cassady is now general manager-field sales for the corporation. Walter B. Wigton has become general manager and William M. Ritter sales manager of the Davis Div. Harry C. Soukup was made acting general manager and Walter L. McCann made chief engineer of the G&L and Hypro Div.

HOW Pratt & Whitney MICROHONES Bores In Titanium Spacers

By Microhoning the bores in rotor disc spacers used in jet engines, Pratt & Whitney obtains final stock removal that efficiently produces close diametric and geometric accuracies (within .0005″) and consistent surface finishes of 15 microinches.

Here's how a Hydrohoner produces these accurate results in 20 different sizes of titanium spacers . . . each spacer having 16 bores that are either .680″ or .590″ in diameter and .110″ in length.

The Hydrohoner is equipped with precise feed and sizing controls that automatically expand and collapse the tool, compensate for abrasive wear, and terminate the Microhoning cycle when required bore size is reached. Also, because fixturing is designed to position all spacers at the same work level, the tool stroke never needs adjustment.

A rotary indexing table automatically locates each bore under the spindle and stops the Hydrohoner when all 16 bores in each spacer are finished. A lateral indexing feature positions the fixture to accommodate various spacer sizes. In fixture change-over, no special tools are required for simple exchanging of four details, and the switch from one spacer size to another requires but a few minutes.

☐ Please send me your movie "Progress in Precision" in time for showing on _____(date).
☐ Please have a Micromatic Field Engineer call.
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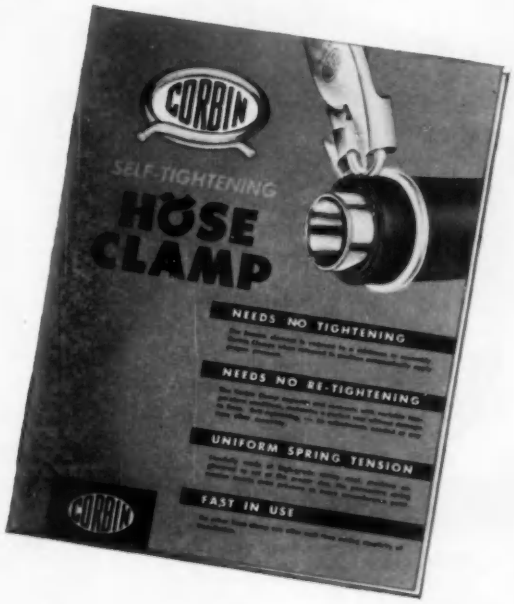

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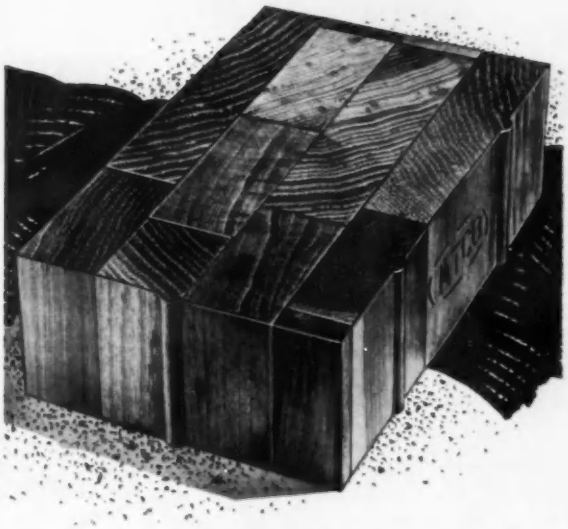

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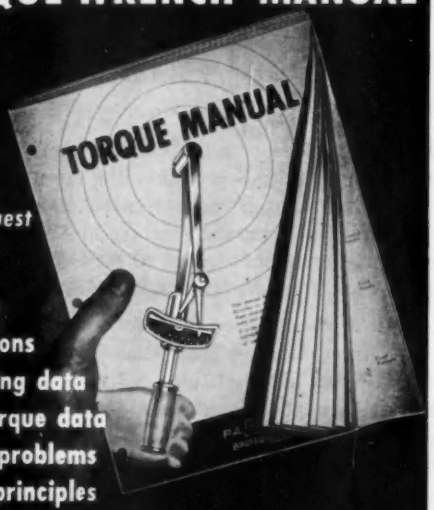

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